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Data were collected from 69 large employers and interviews were held with 25 of these for purposes of introducing the researchers to research in the problems of manpower planning and forecasting. Findings from this heuristic survey of employers included: (1) 72 percent forecast some of their manpower requirements, (2) 36 percent forecast external manpower supply, (3) 59 percent began such forecasting in the past 5 years, (4) 60 percent consider sales and 45 percent consider labor supply for forecasting, and (5) 34 percent forecast requirements for all employee groups. Nineteen case studies are included, focusing on a description of the reporting unit, interesting features of their forecasting techniques, and description of techniques. Data collection instruments and a discussion of the methodology are included in the appendix. (EM)

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INDUSTRIAL RELATIONS CENTER

MANPOWER PLANNING AND FORECASTING IN THE FIRM:
AN EXPLORATORY PROBE

University of Minnesota
Minneapolis, Minnesota 55455

March 1968

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Manpower Planning and Forecasting in the Firm: An Exploratory Probe,

(Project No. 91-25-67-10)

Final Report.

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2

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3 → Minneapolis,

March, 1968

Forward

This is the report of a preliminary exploratory probe of manpower planning and forecasting at the firm level. In essence it is a descriptive survey rather than analytical design. To our knowledge, no similar survey exists; the subject matter is in its infancy.

There is substantial and greatly increasing interest among business concerns in overall manpower planning, and also in one of its components, manpower forecasting. At the same time it must be recognized that their approaches are definitely uneven and experimental, in most cases crude and unsophisticated. There are no generally accepted principles of manpower planning or forecasting.

The actual survey was preceded by collation and publication of an annotated bibliography. (See T. J. Keaveny, Manpower Planning: A Research Bibliography, University of Minnesota, Industrial Relations Center, Bulletin 45, October 1966.) This bibliography was followed by a supplement prepared by Richard J. Snyder and Georgianna Herman in October 1967; both dealt with macro as well as micro planning.

The survey described in this report began as a questionnaire survey. It soon became apparent that no questionnaire could possibly deal with the nuances involved in manpower planning at the firm level. Fortunately, a group of dedicated, research minded practitioners in the Twin Cities area firms joined in the exploration. (While limiting the sample to the Twin Cities area may limit usefulness of generalizations, at this stage of inquiry depth analyses rather than a series of numbers is urgently needed.)

There are too many persons to thank all individually, but surely special note must be taken of:

Wendel W. Burton, 3M
Raymond W. Carlson, FMC Corporation - Northern Ordnance Division
Alex Chudyk, Honeywell, Inc.
Richard D. Conner, Control Data Corporation
Marshall J. Diebold, Northrup, King and Company
Floyd Holm, FMC Corporation - Northern Ordnance Division
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Floyd Rodmeyer, Whirlpool Corporation
Gerald P. Thilgem, IBM
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Throughout the project, a major role was played by A. Edward Hunter, now in the planning office of the Governor of Minnesota. His knowledge insights and dedication were most helpful. Within the IRC staff, Tim Keaveny was project supervisor and ably assisted by:

Paul C. Nystrom
George T. Milkovich
Madan Saluja
Earl L. Vitalis
Donna D'Andrea
Arlette Brown
Kathy Kirchoff
Nancy Parrish

A unique feature of the pilot study was a research conference of the University staff and the participants in the studies, wherein we effectively "pooled our ignorance." We were fortunate to have as keynote speakers, Curtis Aller, Associate Manpower Administrator, OMPER, U.S. Department of Labor, and Frank Cassell, Assistant to the Vice President of Administration, Inland Steel Company.

A special feature of this report is the case studies. Research begets research; a pilot survey even more so! Contained herein (and especially in the case studies) hopefully will be found good suggestions for future research. This project has barely scratched the surface and opened up one of the most challenging and important research areas of our times.

Herbert G. Heneman, Jr.
and
George Seltzer
Project Investigators

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[1] The A preceding the table number indicates that the table appears in the Appendix.

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[1] The A preceding the example number indicates that the example appears in the Appendix.

Manpower Planning and Forecasting in the Firm: An Exploratory Probe

I. Introduction

A. Purpose

Since 1964 the United States has had a "tight" labor supply. In 1966 the unemployment rate dropped below four percent, to reach a 13-year low. However, as noted in the 1967 Manpower Report of the President, it is apparent that expansion of the economy cannot alone eliminate all unemployment and underemployment. During the past few years a number of government programs have been undertaken to deal with problems of structural unemployment. Of primary interest for this research project are those dealing with vocational counseling, education, training and retraining. Before such activities can effectively and efficiently deal with structural employment problems it is necessary to have information indicating current skill demands and supplies, but more importantly future skill demands and supplies. To obtain accurate information describing future labor market conditions it is necessary to develop techniques of manpower forecasting.

At the micro level there is also a need for accurate manpower forecasts. The rate of change in products, in techniques of production, and in techniques of administration have increased in recent times. In addition to the above factors, expansion and contraction of firms and replacement of terminating personnel have significant implications for firms' labor force levels and composition.

A further complication affecting the ability of an organization to maintain an effective work force has been pointed out by Frederick Harbison.[1] He states that of all resources of a firm, manpower taken longest to develop. These two factors, change and time required for human resource development, suggest that a firm must prepare plans which will facilitate meeting its future manpower needs. Such planning, to be effective, presupposes accurate forecasts of manpower demands and supplies.

A recent publication by Dael Wolfle suggests that recent manpower forecasts by skill have been grossly inaccurate.[2] Wolfle indicates that efforts in the area of manpower planning both at the micro and macro level will not be adequate until better techniques of manpower forecasting are developed. The current exploratory research was undertaken to aid in the development of such techniques.

The primary focus of this project has been on techniques of forecasting manpower requirements at the organization level. There were two principle reasons for this decision. First when our concern is with aggregate programs such as those carried on under the Manpower Development and Training Act as well as with planning the training program for a single company, it is necessary to have precise information. To have an accurate estimate of total employment in either case is not enough for we must also have an accurate estimate of the skill composition of the work force. Research at the organization level can satisfy both the macro and micro needs for better techniques of manpower forecasting. When such techniques are developed, their value at the organization level is obvious. In addition, such techniques permit the summation of micro forecasts to arrive at a macro manpower projection. Second, an extensive review of the literature was completed prior to designing this project which indicated an almost entire lack of available information describing the current techniques of forecasting manpower requirements at the organization level.[3] However, before steps could be taken to improve approaches to manpower forecasting it was necessary to identify them. Consequently the Minnesota Industrial Relations Center conducted this exploratory probe to assess the extent and nature of manpower forecasting by firms in the Minneapolis and St. Paul area.

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[1] Frederick Harbison, "Manpower and Innovation: Some Pointers for Management," Personnel, Vol. 36, No. 6, November-December 1959, pp. 8-15.

[2] Dael Wolfle, "The Manpower Prophets", Employment Service Review, Vol. 7, No. 5, August-September 1967, pp. 16-25.

The principle questions which we have attempted to answer are:

- Who is responsible for manpower forecasting?
- What factors affecting manpower requirements are considered in preparing forecasts?
- How are forecasts used?
- What additional information is needed to enable firms to forecast more accurately?

The primary value of this study is not the descriptions which have been gathered, but the questions which have been raised and the hypotheses which have been generated. It is hoped that this exploratory investigation will serve as a foundation for further study and will contribute to the development of more accurate techniques of manpower forecasting.

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[3] Timothy Keaveny, Manpower Planning: A Research Bibliography, Minneapolis, Minnesota, Industrial Relations Center, University of Minnesota, Bulletin No. 45, October 1966.

B. Abstract of Proposal

This exploratory study was intended to provide the necessary introduction to permit more research into the problem of manpower planning and forecasting. Twenty firms were to make up our sample. The objective was to assess the extent and nature of manpower planning and forecasting, with particular emphasis on the techniques of forecasting and the factors considered by these techniques. Other areas to be studied were: managerial attitudes toward manpower planning; manpower decisions based on forecasts; the relationship of manpower forecasting and planning to other corporate planning; and guidelines for manpower forecasts by firms.

C. Abstract of Report

The report is based on the questionnaire responses of 69 employers and on interviews with 25 of them. Those participating in this study include most Minnesota organizations with over 500 employees. Our findings pertaining to the following topics are reported: the extent of manpower forecasting (both supply and demand); stated reasons for not forecasting; the employee groups for which forecasts are prepared; the flow of manpower forecasting (who prepares forecasts and who uses them); the uses made of manpower forecasts; the techniques of forecasting; information necessary for better manpower forecasts; evaluation of present forecasting techniques; guidelines for organizational manpower forecasting; and areas for additional research.

II. Summary of Findings

The principle findings of this study listed below are based primarily on the questionnaire returns of the 50 respondents which forecast manpower requirements.[1] Some findings are based on a significantly different number of returns, and when this is the case the number is indicated in parenthesis. The findings based on the 25 interviews are so designated.

- 72% forecast all or some proportion of their manpower requirements (N = 69).
- 36% forecast external manpower supply (N = 69).
- 43% of those which forecast manpower requirements do not forecast external manpower supply.
- 44% of the forecasts of requirements are prepared by the personnel department.
- 59% began their manpower forecasting activities within the past five years.
- 44% prepare forecasts covering five or more years and 44% prepare forecasts covering one year or less.
- 71% prepare their manpower forecasts once each year, or at longer intervals.
- Sales and labor supply are the two most common predictors of labor requirements. 60% consider sales and 45% consider labor supply.
- Only 17% use technological and administrative change to predict labor requirements.

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[1] The sample for this investigation was not selected on a purely random basis, consequently these findings should be viewed as tentative.

- 34% forecast requirements for all employee groups.
- Over 90% use manpower forecasts to plan recruiting efforts. About 1/3 relate manpower forecasts to planning training and to promotions and transfers, and only 11% relate their forecasts to planning of facilities and production.
- The typical reaction to an underestimate of requirements is to accelerate hiring and the typical reaction to an overestimate of requirements is to slow or stop hiring or to lay off employees (N = 17).
- Managerial and professional requirements are reported to be the most difficult occupational groups to forecast (N = 31).
- The following types of information are said to be needed to improve the accuracy of forecasting: company plans and objectives; sales and production forecasts; internal and external labor supply; and technological and administrative change (N = 27).
- Only 20% consider forecasts prepared by outside organizations when projecting their labor requirements.
- Stable labor demand and stable labor supply are the most common explanations for not forecasting manpower requirements (N = 9).
- The interview results indicate that line management feels manpower forecasting is a necessary activity at the organization level.
- The interview results suggest that some organizations have techniques at the present time which result in quite accurate forecasts of manpower requirements; however, the techniques used by most are inadequate for effective manpower planning.

III. Methodology[1]

The sample for this investigation is composed of most Minnesota organizations employing 500 or more people. Two techniques of gathering data were utilized. A mail questionnaire was developed which provided an overview of the respondents' techniques of manpower forecasting. Personal interviews were arranged with those whose questionnaire responses indicated a unique or sophisticated approach to manpower forecasting was utilized. Of the 105 employers sent questionnaires, 69 useable returns were received, and 25 interviews were conducted.

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[1] A complete description of the methodology employed in this study is included in Appendix A, and copies of the final questionnaire and interview guide are included in Appendix B.

IV. Additional Research Needs

Although the immediate goal of this exploratory project is to investigate techniques of manpower forecasting, our principle concern is effective manpower planning at the organization and local labor market levels. In our opinion, accurate forecasting of manpower supplies and demands must precede efficient allocation and utilization of human resources. The findings reported here suggest that the currently employed forecasting techniques are inadequate and that intensive research into techniques of forecasting micro manpower supplies and demands is necessary before addressing the problems of manpower planning. The following are specific areas of manpower forecasting which, in our opinion, should be studied.

A. Labor Demand

1. Examine intensively the techniques of forecasting manpower requirements currently employed to determine what assumptions underly such techniques, what corporate data are utilized in preparing these forecasts and what use is made of data currently available from other sources.
2. Determine the adequacy of current techniques in forecasting the firms total employment, requirements for specific skill groups or job clusters and requirements for specific key positions.
3. Longitudinally study the causes or reasons for manpower changes within organizations to identify additional

variables and factors not considered in current forecasting techniques which have an impact on manpower requirements.

4. Investigate the merits of forecasting a range of manpower requirements.
5. Develop a model which based on the previous areas of inquiry would permit the assignment of weights to the variables and constraints related to manpower requirements and the identification of the nature of the relations among these variables and constraints.
6. Determine the adequacy of this model among firms within an industry and across industries.
7. Identify those factors which are constraints at the organization level but which are variable at other levels, thus for example providing more information to government officials of what is to be varied if their goal is to affect the demand for labor in a specific industry, geographic area or occupation.
8. Investigate the feasibility of forecasting the demand for labor in a local labor market by summing the manpower forecasts of the area's major employers.

B. Labor Supply

1. Examine intensively the techniques of forecasting internal and external supply currently used by organizations to identify the assumptions made, the factors considered and the use made of information available from sources outside the firm.

2. Identify the accuracy of current techniques of forecasting internal and external labor supply, both in the aggregate and by skill groups.
3. Identify variables and factors not generally considered by firms at present which would enable them to be more accurate in predicting internal and external supply.
4. Develop a simulation model for forecasting a firm's internal labor supply by job group and by location and investigate its adequacy among firms within and between industries.
5. Identify information which government agencies could and should make available to aid firms in forecasting their external supply of labor by job group and by location.

C. Determine the costs and benefits of forecasting labor supply and labor demand.

V. Tentative Guidelines for Manpower Forecasting at the Organizational Level

A. Introduction

Considerations and guidelines for designing an organization's manpower forecasting program will be discussed in this section.[1] Included are the factors which appear to have an impact on manpower requirements, suggestions for the operational definition of manpower requirements, whether forecasts should be for employee groups or for specific individuals, considerations regarding who should prepare the manpower forecasts, how often they should be done, what period they should cover and how the forecasts should be used.

B. Predictors of Manpower Requirements

1. A Model of Manpower Forecasting

The survey results indicate that ten factors are commonly used to predict manpower requirements. The proportion of respondents considering each is:

Sales	62%	Turnover	19%
Quality of internal labor supply	45%	Technological and administrative change	17%
Facilities expansion	36%	New products	17%
Work load (Production)	34%	Company plans and objectives	15%
External labor supply	28%	Budgets	11%

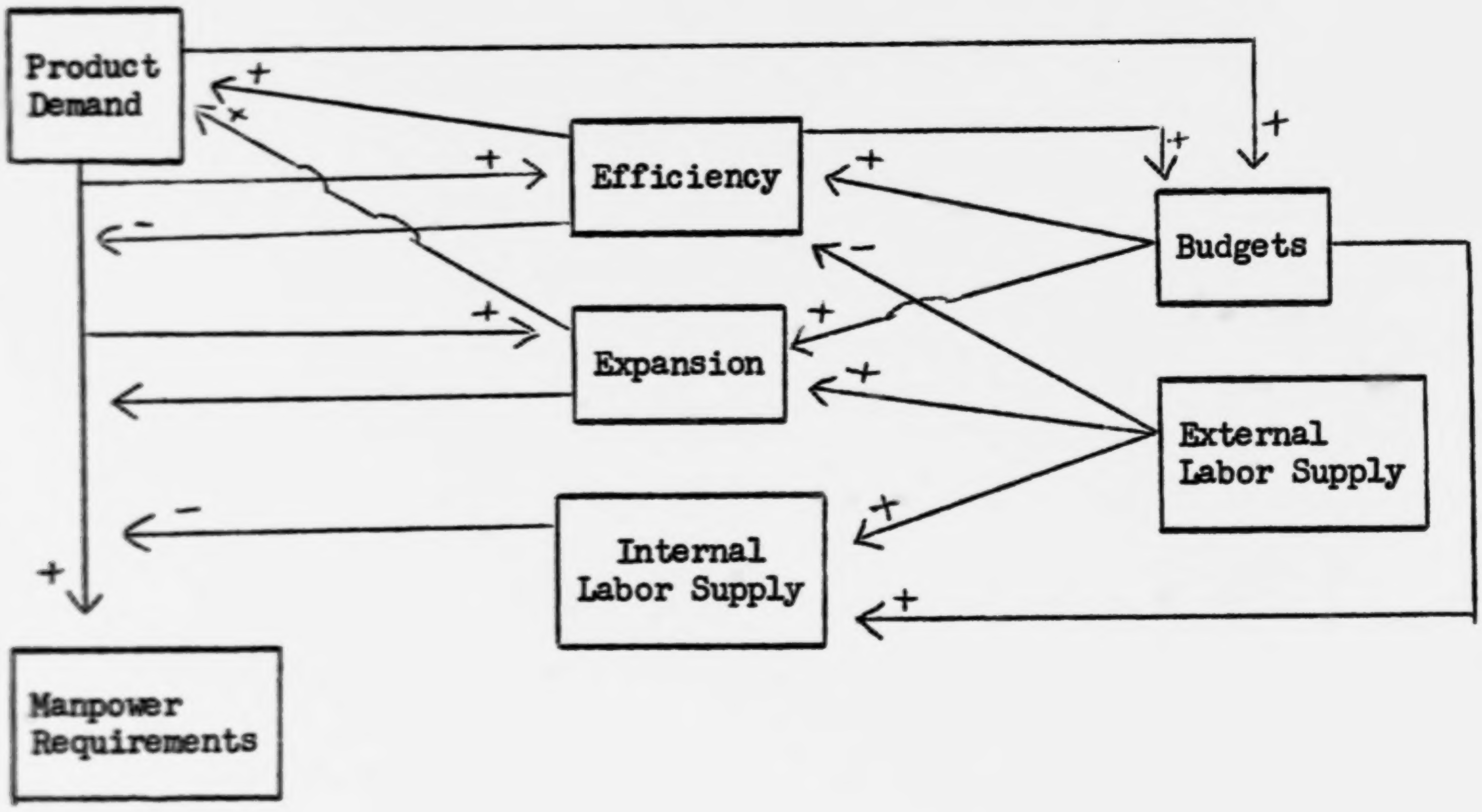
Before describing how these variables or factors are used to predict manpower requirements, the researchers will attempt to provide an overview which will clarify their relationship with manpower requirements, and with each other. The above variables and factors can be accounted for by the following model.

---

[1] The results of this project do not provide evidence which allows the researchers to specify the best techniques for manpower forecasting. However, the available information does offer some suggestions as to what could be the more fruitful approaches to this activity.

Diagram 1

A Model of Manpower Forecasting



The dependent variable, manpower requirements, is defined as the number of replacements or additional men needed and is expressed in terms of occupation or skill level. The independent variable, product demand, is estimated by forecasting sales or by forecasting work loads. The relationship between product demand and manpower requirements is assumed to be positive.

The nature of the relationship between product demand and manpower requirements is influenced by the following intervening variables: increased efficiency, expansion, budgets, external labor supply and internal labor supply.

Increased efficiency refers to technological and administrative changes which increase labor productivity, consequently reducing manpower requirements per unit of output. Because the dependent variable is defined according to occupational requirements, instances will be found in which technological and administrative change increases the demand for certain occupational groups. However, it is expected that in general manpower requirements will be lowered. It is also hypothesized that increases in efficiency which lead to price reductions will result in increases in sales, and consequently manpower requirements. The net effect of increased efficiency depends on the price elasticity of product demand and on the magnitude of the increase in labor productivity. Increased efficiency is expected to positively affect budgets or financial resources.

The next intervening variable, expansion, includes facilities expansion and new products. Expansion increases product demand and also may have an impact on the relationship between product demand and manpower requirements. The nature of the latter relationship has not been specified because it is specific to each situation.

Internal labor supply includes both the quality or skills of an organization's labor force and the quantity of employees. The former is estimated by skills inventories and forecasts of employee development and the latter by turnover figures. As indicated in the diagram, it is assumed that as the internal labor supply increases manpower requirements for given levels of product demand will be reduced.

Financial resources or budgets are assumed to have a positive impact on internal labor supply, external labor supply, expansion and efficiency. As budgets increase, more training can be given to the current labor force thus increasing the quality of labor and higher wages can be offered which will tend to reduce separations and increase the external supply of labor. Larger budgets also facilitate capital investment.

The last intervening variable is external labor supply which is defined as the manpower, by occupation or skill level, available to the firm. As indicated above it is assumed that external supply can be manipulated by varying wage rates.[2] It is predicted that large external labor supplies of the type currently used by an organization will restrict the introduction of labor saving innovations, but will increase the likelihood of expansion (assuming sufficient product demand), and will be positively related to financial resources. The last relationship assumes that if an excess external supply exists, labor costs will be less than would otherwise be the case. Based on the evidence indicating an inverse relationship between separation rates and unemployment rates it is hypothesized that as the external labor supply increases, the internal labor supply will also increase because of a reduction in separation rates.[3]

The independent variable, product demand, is assumed to have a positive impact on several of the intervening variable. It is predicted that as product demand increases: pressures for increases in efficiency are greater, the likelihood of product line and facilities expansion increases, and financial resources become larger.

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[2] It is recognized that the degree to which the external supply of labor for certain occupations can be influenced by manipulating wages is limited in the short run. The hypothesized relationship assumes that individuals with the required skills are unemployed, or can be attracted from other firms and geographic areas, or can be drawn into the labor force. If the particular skills are in short supply and a long training period is necessary to develop the required skills, increasing wage offers will probably not influence the short run external labor supply.

[3] Herbert S. Parnes, Research on Labor Mobility: An Appraisal of Research Findings in the United States, New York: Social Science Research Council, 1954, pp. 135-138.

In the above discussion, budgets and external supply of labor are viewed as variables which individual firms can manipulate. Some respondents do view them as variables, while others view them as constraints or givens.

The input to manpower forecasting reported by the survey respondents which is not discussed in the above model is company plans and objectives. The reason for this is that part or perhaps all of the intervening variables may be included in plans and objectives, and consequently this input cannot be placed in any one category.

Diagram 2 includes terms describing the operational meaning of each variable and the proportion of respondents considering each. Almost all respondents include an estimate of product demand.[4] The inadequacy of current approaches to forecasting would seem to be demonstrated by the proportion considering various aspects of each intervening variable. None is included in the forecasting techniques of even half the survey respondents which forecast requirements. Only two, quality of internal supply and facilities expansion, are considered by more than one-third of those reporting.

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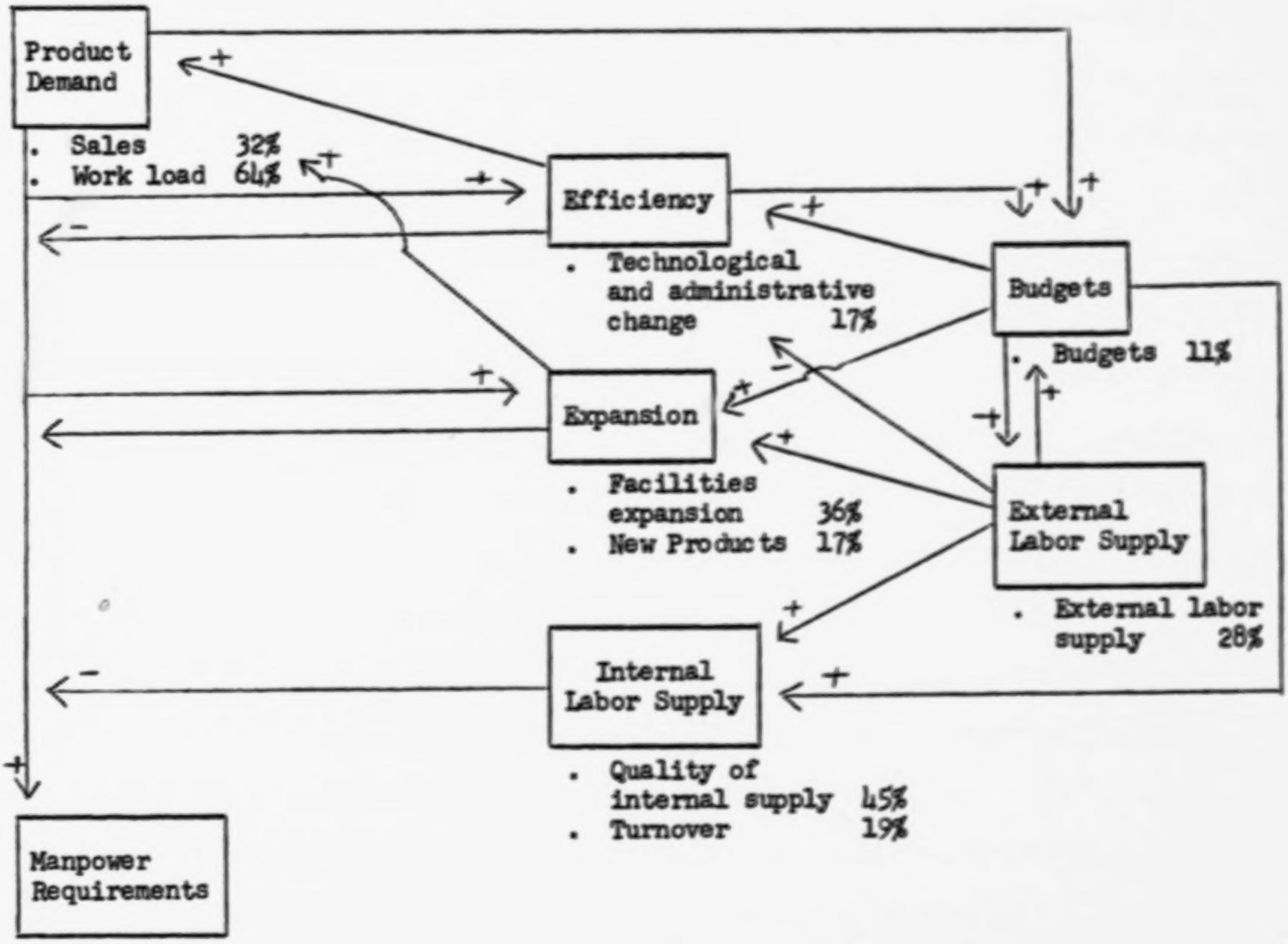
[4] The assumption is that sales forecasts and work load forecasts are substitutes in so far as manpower forecasting is concerned. If a firm has either, there is little additional contribution from the other. As is noted in the following section, assuming substitutability of production and sales forecasts is not always valid. On the other hand, efficiency and internal labor supply each have two aspects which are assumed not to be substitutable, therefore each should be considered in forecasting manpower requirements.

Diagram 2

A Model of Manpower Forecasting:
Proportion Considering Each Variable


Product Demand
. Sales 32%
. Work load 64%
Efficiency
. Technological and administrative change 17%
Budgets
. Budgets 11%
Expansion
. Facilities expansion 36%
. New Products 17%
External Labor Supply
. External labor supply 28%
Internal Labor Supply
. Quality of internal supply 45%
. Turnover 19%
Manpower Requirements
+
-

2. Procedures for Identifying and Estimating Predictors

The intention of this section is to indicate some considerations for selecting variables to predict manpower requirements, and to describe some of the procedures used to estimate their nature and impact.

Sales or production forecasts are commonly used to predict manpower requirements. Typically the historical relationship between one or the other and employment is established, and based on this relationship and on the sales or production forecast an estimate is made of manpower needs. A problem with trend or ratio forecasts is that except in static organizations the relationship is not stable. One approach to this problem is to control it statistically with a technique called exponential smoothing. Essentially this involves giving greater emphasis to the more recent relationship between sales or production and manpower needs. For example, the average number of widgets produced per employee over the last five years may be 500, but the average for last year may be 550. The technique being described suggests that the forecaster give more weight to the latter figure in estimating the average output per employee for the coming year. A second approach is to take into consideration the factors affecting the relationship. Identification of these factors is preferable for two reasons. First, the relationship between sales or production and employment can be affected by some non-recurring event. The statistical approach will identify the impact of such an event, but the resulting projection will be in error because it assumes the event will continue to occur. The second reason involves the impact of intervening variables on the relationship between product demand and manpower requirements. If the impact of significant intervening variables is identified and considered in manpower forecasting, more accurate predictions can be made. Some of the relevant intervening variables and their prediction or control are discussed in the following paragraphs.

Some organizations have had difficulty when sales was used as a predictor because of such factors as inflation, rising costs of production and producing for inventory. These factors can lead to an inaccurate estimate of the relationship between sales and manpower requirements. If allowances for these influences cannot be made in the sales forecast, it may be preferable to base manpower forecasts on production estimates.

Regardless of whether sales or production is used the relationship with employment will usually be influenced by product, administrative and technological change. Consequently to accurately predict manpower requirements it is necessary to predict these changes and their manpower implications. Since only 17 percent of our respondents consider product and technological and administrative change in forecasting manpower requirements, one should not be surprised that forecasts are not very accurate. Possibly 17 percent is an overestimate of the proportion which really consider change if the respondent described in case 11 is typical. This organization relies on "rules of thumb" to estimate the impact of technological change. Perhaps many of those which do not formally consider change in preparing their manpower forecasts are in circumstances similar to those of the reporting unit described in case 18. The individual responsible for projecting manpower needs is aware that product and technological changes having an impact on manpower requirements are made almost continuously. However, any particular change is believed to have little impact, and the time required to identify each is not justified. This is an empirical question which has yet to be investigated.

The problem of predicting change and its impact is especially difficult if the firm is a leader in its product field or in developing technological and administrative innovations. Case 1 describes one such organization. Several alternatives to dealing with this problem have been suggested by case studies. University research findings will in many instances provide an opportunity to anticipate the nature and impact of change. By maintaining contact with appropriate research units one is in a better position to forecast change and its impact on labor needs. This approach is relied upon by the organization described in case 10. Another alternative which provides information specific to the particular organization, but which may afford less time for anticipation of change is to maintain contact with the organization's research and industrial engineering departments. Case 8 is an example of a respondent relying on this approach. It would seem valuable to employ both techniques. The former aids in predicting the more distant future and the latter the more immediate future.

The last case referred to raises an additional consideration for manpower forecasting. When a new or different product is being worked on, great increases in efficiency can be anticipated as the employees become familiar with the product. For example, data on learning curves gathered in the aircraft assembly industry indicate that when the number of units produced doubles the time required per unit decreases by 80 percent.[5] This suggests that in organizations experiencing frequent product change some consideration should be given to learning curves. Learning curves may also be relevant whenever one is not familiar with a job. Examples are new employees and persons recently transferred or promoted (see case 13).

The problem of predicting change and the impact of change is greatly simplified when the organization is not leading in its development and implementation. This situation is probably more common. Typically organizations are the leader in developing and implementing only limited numbers and types of innovations. Most changes are borrowed or bought from other firms. One can obtain information which predicts change and its impact through trade or other associations and through industrial espionage. When innovations are marketed, information indicating the manpower implications of the changes is usually made available by the developer.

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[5] Winfred B. Hirschman, "Profit from the Learning Curve". Harvard Business Review, January-February 1964, pp. 125-129.

The predictor, expansion of facilities, is closely related to company plans. It is a relevant predictor in organizations with a number of separate locations, assuming the labor force composition of the different locations is relatively homogeneous.

Both internal and external labor supply are pertinent for predicting manpower requirements and for manpower planning. Typically organizations which consider external labor supply rely on government publications for this information, but in most instances these forecasts are inadequate. At present the forecasts of labor supply and information describing the current labor supply are too general to be very useful in projecting labor requirements. Data is needed for specific occupational groups and geographic areas. A few organizations are gathering such information. Case 12 describes in detail one organization's approach to forecasting its external labor supply.

As with external labor supply, it is useful to identify and project the quality and the quantity of internal labor supply. The usual approach to identifying current quality is a skills inventory. Forecasting quality is more difficult. One alternative is to plan the training each employee is to receive (see case 15), and another alternative described in case 9 is to identify the average rates of progression in the typical promotion routes. The final alternative suggested by our findings provides more detailed information. One could have each supervisor estimate when each of his subordinates will be ready for promotion to specific positions. In certain situations the latter technique would appear to be best. When promotability tends to be a function of experience or informal training such as coaching rather than formal training the first alternative would be inadequate. When individual rates of development and/or promotion routes are quite variable reliance on averages would be inadequate. Clearly the approach which is applicable depends on the particular circumstances.

Trends in separation rates are typically the basis for projecting the quantity of internal labor supply. A number of considerations for forecasting this aspect of internal supply were suggested by our investigation. It is advisable to estimate separation rates by occupational group because of variance in rates by skill level. Identification of retirement dates is important at all levels, and especially for the higher management positions because several years may be required to develop replacements. In short-run forecasting and planning it could be valuable to consider dates and length of vacations. Finally, trends in separation rates appear to be influenced by alternative employment opportunities, therefore, more accurate projections of separation rates may be possible by adjusting them for economic activity.

C. Forecast Requirements for Which Employee Groups?

Forecasting the total manpower requirements of an organization is not sufficient. A number of our respondents have had relatively small changes in total employment during the past few years, but have experienced significant changes in the skill composition of their work forces. To plan recruiting, training, transfers and other manpower related activities, it is necessary to project requirements for specific occupational groups, and for specific geographic areas if the organization has more than one location.

Some respondents forecast requirements by position for the top management level and for key jobs. Cases 3, 4, and 15 describe reporting units employing this approach. The reason for such narrow forecasts is it is crucial to have capable individuals in these positions and the supply of such personnel is limited. Importance and supply appear to be the relevant considerations for choosing among forecasting by location and occupational group, by location and position, or forecasting at all. Case 14 refers to an organization which does not forecast its production worker requirements because it has never experienced difficulty in filling openings at this level on short notice. If this continues to be the case, forecasting requirements are not necessary, but just as requirements change over time so does supply. Recall in the preceding section on predictors that most of our respondents do not forecast labor supply, or consider government forecasts of supply. This leads the researchers to conclude that most organizations do not have the information necessary to decide whether to forecast requirements at all, and if so, requirements for which skill groups and positions.

D. Relating Predictors to Manpower Requirements

The principle differences in how the respondents relate predictors to manpower requirements involve precision or detail. Many base their manpower projection on a forecast of aggregate sales or aggregate production. Others base it on forecasts of sales by product or production by product. An advantage of the latter technique is it accounts for at least part of the changes in manpower requirements resulting from product change. An even more refined approach is to identify the purpose or function of each job and relate it to sales or production. In essence one is forecasting the work for each job. In general the procedure is to identify the time required per unit of work for each job, forecast the work load for each job, and divide the latter by the former to forecast manhours required. Cases 5 and 16 describe this technique in much greater detail.

It is reasonable to expect that in most organizations labor needs for some jobs do not vary with production. Case 16 describes an organization which draws a distinction between variable labor requirements or those which are a function of the level of production, and fixed labor requirements or those which are not related to the level of production. The jobs classified as fixed are viewed as constants in manpower forecasting. When the techniques described in this and the preceding paragraph are used, it is probable that most changes having an impact on manpower requirements will be accounted for and consequently result in more accurate manpower projections.

In situations which tend to be static the detailed procedures outlined above may not be necessary. One respondent whose circumstances are certainly not static reports amazing accuracy of manpower forecasts based on aggregate sales projections (see case 13). However, in evaluating such evidence, it is necessary to distinguish manpower forecasts which serve as a guide for manpower planning and those which are used as a control device. Once a manpower forecast has been approved, if one is unable to deviate from that forecast, it follows that the forecast will be accurate. In our opinion the current techniques of manpower forecasting are not accurate enough to justify using forecasts as a control, and if used in this way may be less valuable than no manpower forecasts.

Because of the large number of factors having an impact on manpower requirements and our inability to accurately anticipate the future states of these factors, it seems advisable to project a range of labor needs. Case 1 describes an organization employing this technique. Essentially, the procedure is to forecast the most probable labor requirements, the likely maximum labor requirements and the likely minimum labor requirements. Forecasting a range of needs guides one in devising contingency plans to meet requirements if they depart from the most probable forecast.

E. Who Should Prepare Manpower Forecasts?

The questionnaire results indicate that among those respondents which forecast manpower requirements, 44 percent are prepared by personnel departments, and most of the remainder are the responsibility of individuals in line positions. In the discussion of predictors, we state that it is necessary for those responsible for forecasting to have access to all relevant information. The questionnaire findings indicate this is not the case. The most frequently mentioned factor believed to be necessary for better forecasts is being informed of company plans and objectives. Cases 9 and 18 describe situations in which it is standard procedure for top management to revise projections on the basis of information not available to those responsible for manpower forecasting.

Who has or can obtain the necessary information should be the principle consideration in determining responsibility for the forecasting activity. It is probable that neither line managers nor personnel managers at the present time have all the necessary information. There are at least three alternatives to deal with this problem. One can have either line managers or the personnel department prepare the forecasts and have the other party supply relevant information on inputs to those responsible for forecasting. A second approach is to have both prepare manpower forecasts and then meet to resolve differences. This is the technique used in the organization described in case 17. The final alternative is to create a position which has the function of manpower planning and forecasting. This approach appears to have been successful in one organization (case 16), but in others problems persist.

F. The Frequency of Forecast Preparation

Determining how often manpower forecasts should be prepared depends largely on the frequency of changes in the input factors and the ability to predict these changes. For example, an organization whose business depends on long term contracts does not need to prepare forecasts as often as one whose production is less predictable.[6] Seventy-one percent of our respondents prepare forecasts at one-year or longer intervals. Apparently many are of the opinion there is little change in one year or they are able to predict change for one year. The accuracy data is limited, but available evidence does indicate that more frequent forecasts may be helpful. The organization which is most accurate in its predictions prepares them every two months and regularily updates the relationship between predictors and manpower requirements (see case 16).

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[6] This consideration has implications for the length of the forecast period and will be discussed in the following section.

Another consideration for determining frequency of preparation is the length of time covered by the forecast. Some of our respondents prepare one year forecasts annually. The value of such an approach is certainly limited compared to one year forecasts prepared more frequently, for example, quarterly. With the latter, one always has at least a nine month forecast which provides some lead time for meeting requirements, whereas with the former, one has no forecast at all just prior to preparing a new forecast. The researchers suggest that a rolling forecast approach always be used.

G. The Forecast Period

The questionnaire results indicate that the two most common forecast periods are one year and five years. Two important considerations in determining the length of the forecast are the ability to accurately forecast and the use or uses of the forecast. There is little value in forecasting requirements for five or ten years hence if one is essentially guessing. On the other hand, a one year forecast is inadequate for many positions if one intends to develop personnel internally to meet the projected requirements. Our results suggest that among those preparing only one year forecasts the principle purpose is to guide recruiting, and among those preparing longer forecasts a greater proportion use them for guiding such activities as training, transfers and promotion.

A means of dealing with this problem is to identify the fixed positions, or those which tend not to vary with business activity. This allows one to develop a much longer forecast for these positions, thus permitting the development of an internal supply. In the organization using this technique, the more crucial positions tend to be the fixed positions (see case 3). This may not be true in other organizations, but it appears to be the best alternative available to deal with the problem of being unable to prepare accurate longer range forecasts for all positions.

H. The Uses of Manpower Forecasts

Over nine out of ten respondents use their manpower forecasts to plan their recruiting efforts. About a third use them for financial, training, transfer and promotion planning. The less common uses are product pricing and facilities, production, acquisition and expansion planning. Cases 8, 16, and 17 describe organizations using their manpower forecasts in all or most of these ways.

That so few organizations relate their manpower forecasts to phases of organization planning other than recruiting is surprising since the questionnaire findings indicate that most already prepare plans for facilities, materials and finances. Possible explanations are the relatively short time period covered by many manpower forecasts, or a lack of communications and efforts to integrate plans. The former may involve accuracy, thus indicating a need for better forecasting techniques. The latter suggests that firms either have failed to recognize that all phases of organization planning must be integrated, or at least have failed to implement a procedure which integrates all phases of organization planning. Case 17 describes one way to approach total organization planning. The full value which can be derived from manpower forecasting and planning will not be achieved unless integrated with the other aspects of organization forecasting and planning.

VI. Questionnaire Findings

A. Proportion Forecasting Manpower Demand and Supply

Table 1 shows some characteristics of the organization units which participated in our exploratory survey. The term "reporting unit" is used since a portion of the replies referred only to a division or a plant within a company, and may not describe the manpower forecasting activities, if any, of the balance of the organization.[1] Sixty-nine useable questionnaires were returned. Forty-three of the reporting units were in manufacturing industries and twenty-six were in non-manufacturing industries.[2]

Seventy-two percent of the reporting units in this survey forecast all or some portion of their manpower requirements, as shown in Chart 1. Forecasting manpower needs appears to be more common among firms in non-manufacturing industries wherein 81 percent forecast as compared with 67 percent in manufacturing. There is a rather surprising finding in the light of Harbison's study of large American firms reported in 1958. He found very few corporations which forecasted their manpower needs. Industry is now recognizing that, as Harbison states, manpower is the resource which takes longest to develop, and therefore, must be planned for.

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[1] As with any mail survey, the returns are probably selective--therefore, this should not be regarded as a representative sample. It is, for example, possible that while each reporting unit which forecasts its manpower requirements did respond, a majority of those who do not forecast for manpower did not respond. This survey's objective was exploratory rather than normative.

[2] See Table 1. As shown by the difference between the mean and median number of employees, the mean figures are distorted because of the inclusion of a few very large corporations which participated in this study.

Table 1

Size of Reporting Units

Type of Industry	N	Average No. of Employees	Median No. of Employees
Manufacturing	43	7917	1500
Non-Manufacturing	26	3303	1650
All Reporting Units	69	6178	1500

Chart 1

Proportion of Reporting Units Forecasting Manpower Requirements

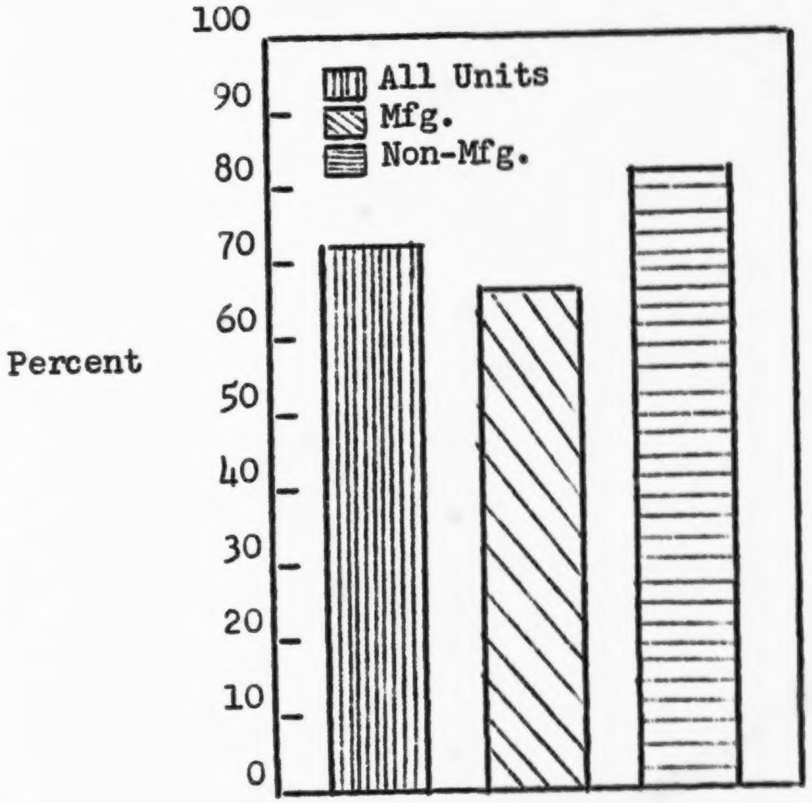

Chart 2 shows the greater variability among types of manufacturing firms when classified by industry compared to the consistency among non-manufacturing industries represented in the survey. Thus 91 percent of equipment manufacturing firms made forecasts as compared with 20 percent of wood manufacturing organizations.[3]

The analysis by size of reporting unit shown in Chart 3 suggests that forecasting manpower needs is partly a function of the number of employees, with only 50 percent of those with fewer than 1000 employees forecasting, while 88 percent of those with 5000 or more employees forecast.

Chart 4 shows that only 36 percent of the reporting units forecast manpower supply--only half as many as forecast manpower requirements. As found with manpower needs forecasting (see Chart 1), relatively fewer of the reporting units in manufacturing industries forecast manpower supply than do those in non-manufacturing firms of which 42 percent forecast supply as compared to 33 percent in manufacturing (Chart 4). The effect of size of the reporting unit does not appear as functional for forecasting manpower supply, as shown in Chart 5, as was the case with forecasting manpower needs (see Chart 3). For some unexplained reason, perhaps variance in the proportion of openings or in selection ratios, the medium-sized reporting units more often forecast supply, with 47 percent of the firms with 1000 - 1999 employees and 40 percent of those with 2000 - 4999, compared to only 23 percent and 35 percent for units with less than 1000 or more than 5000 employees respectively.

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3. Because of the small N's, these results must be regarded as highly tentative. They are presented here because we know of no similar studies and thus subsequent, more structured researchers may wish to consider even such limited evidence in their designs.

Chart 2

Proportion of Reporting Units Forecasting
Manpower Requirements
(by Industry)

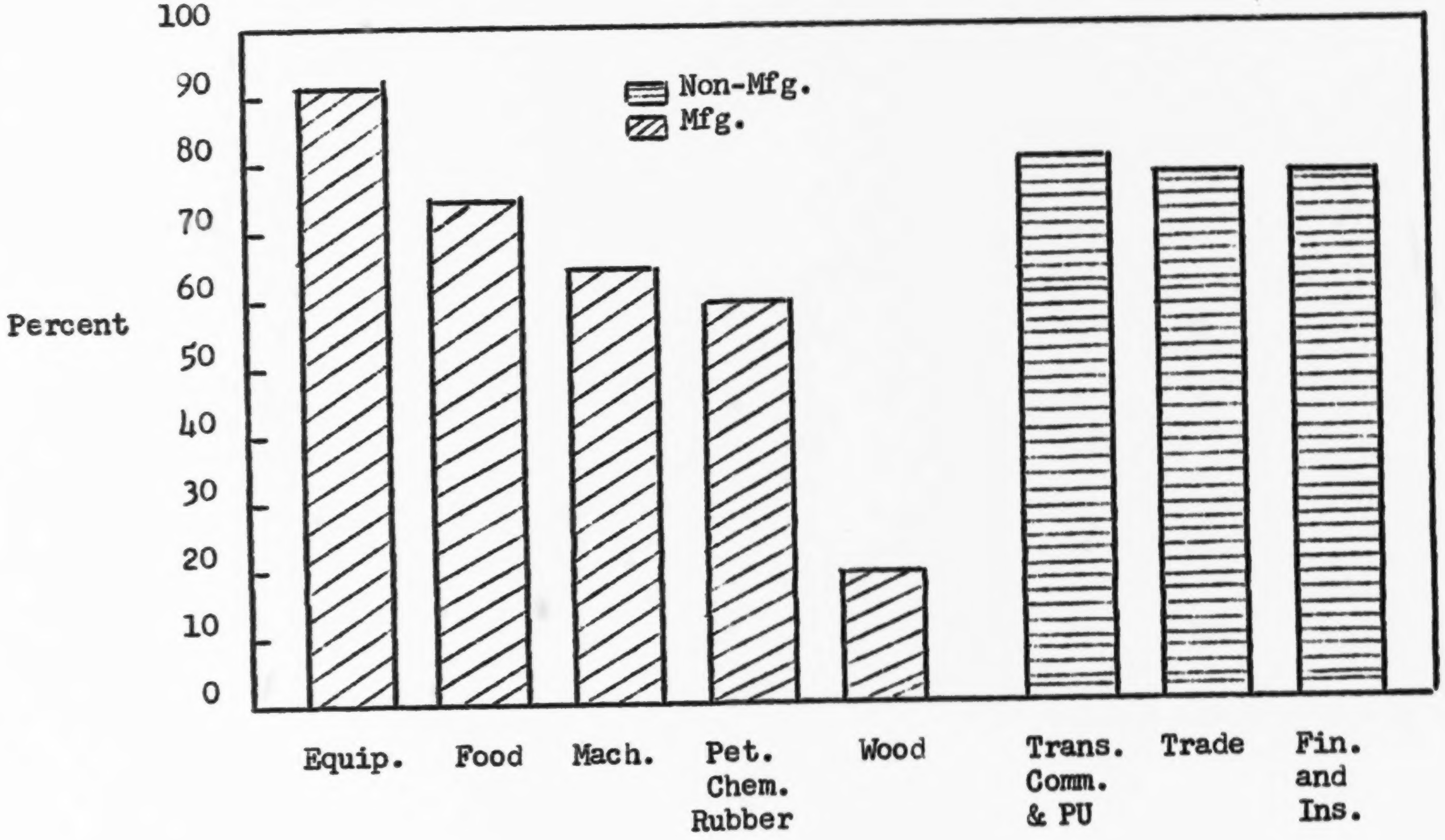


Chart 3

Proportion of Reporting Units Forecasting
Manpower Requirements
(by Size)

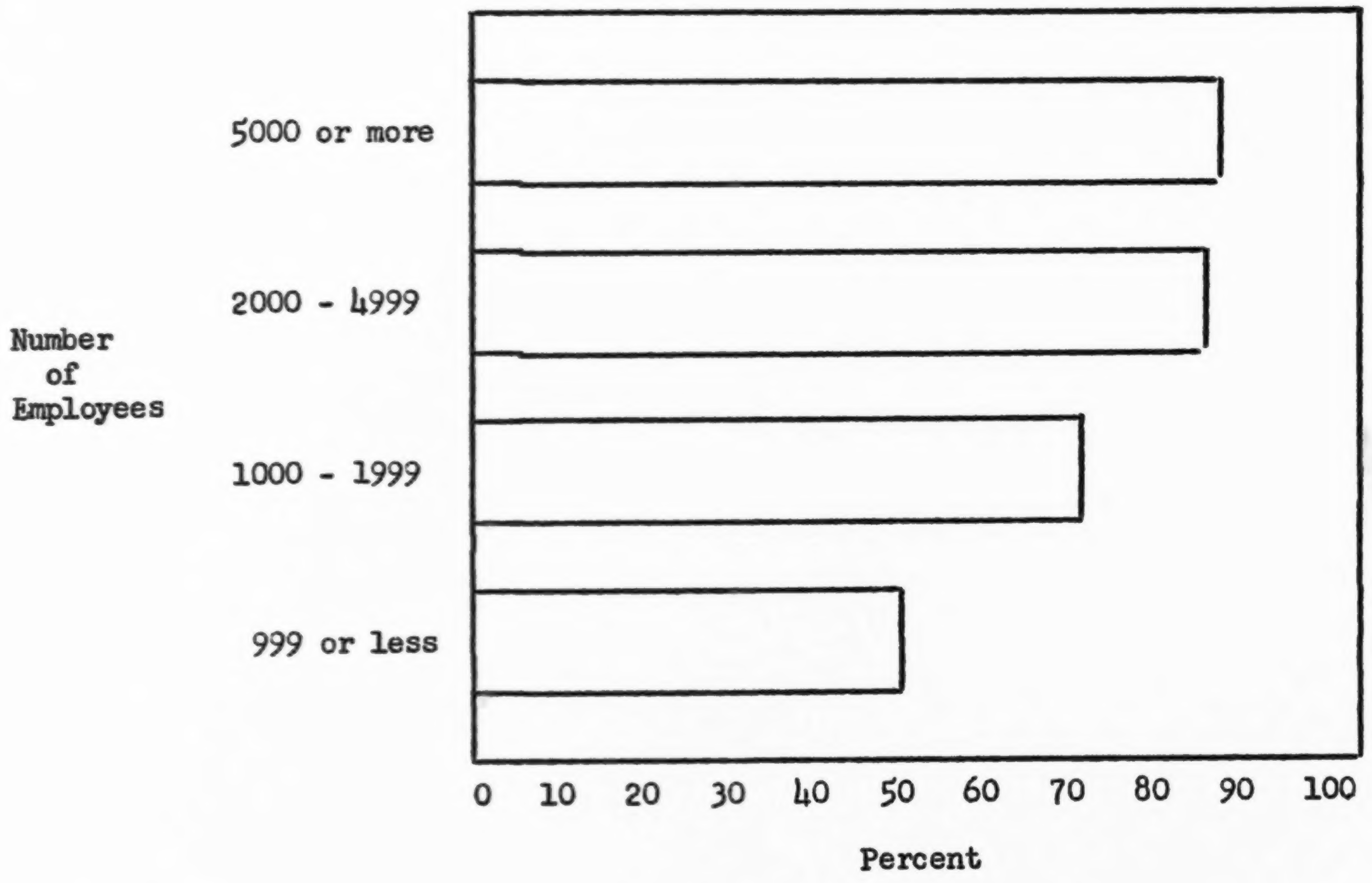


Chart 4

Proportion of Reporting Units
Forecasting Manpower Supply
(by Industry)

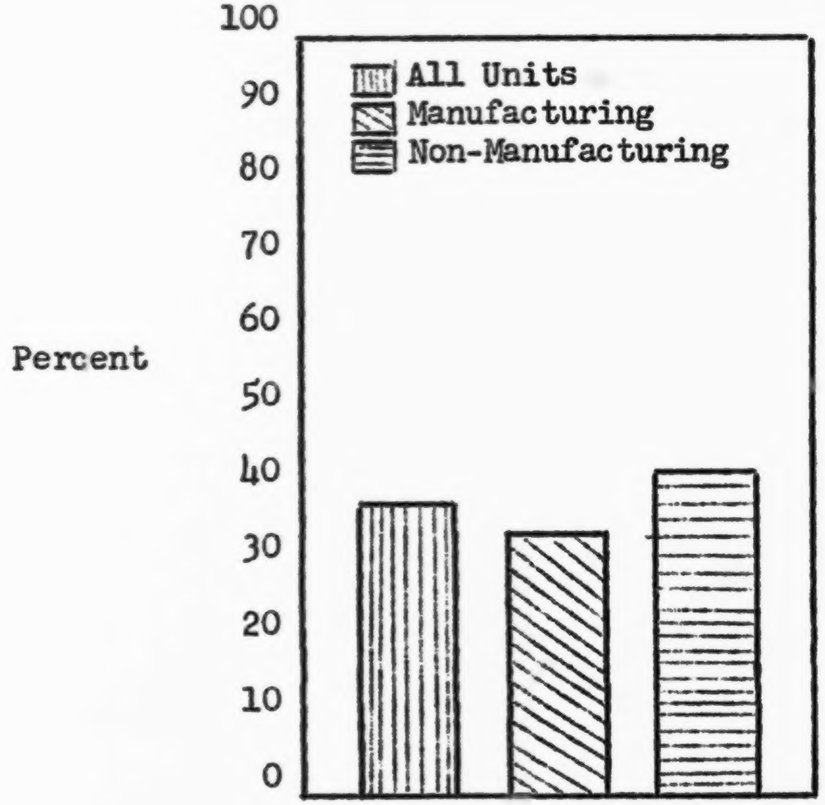
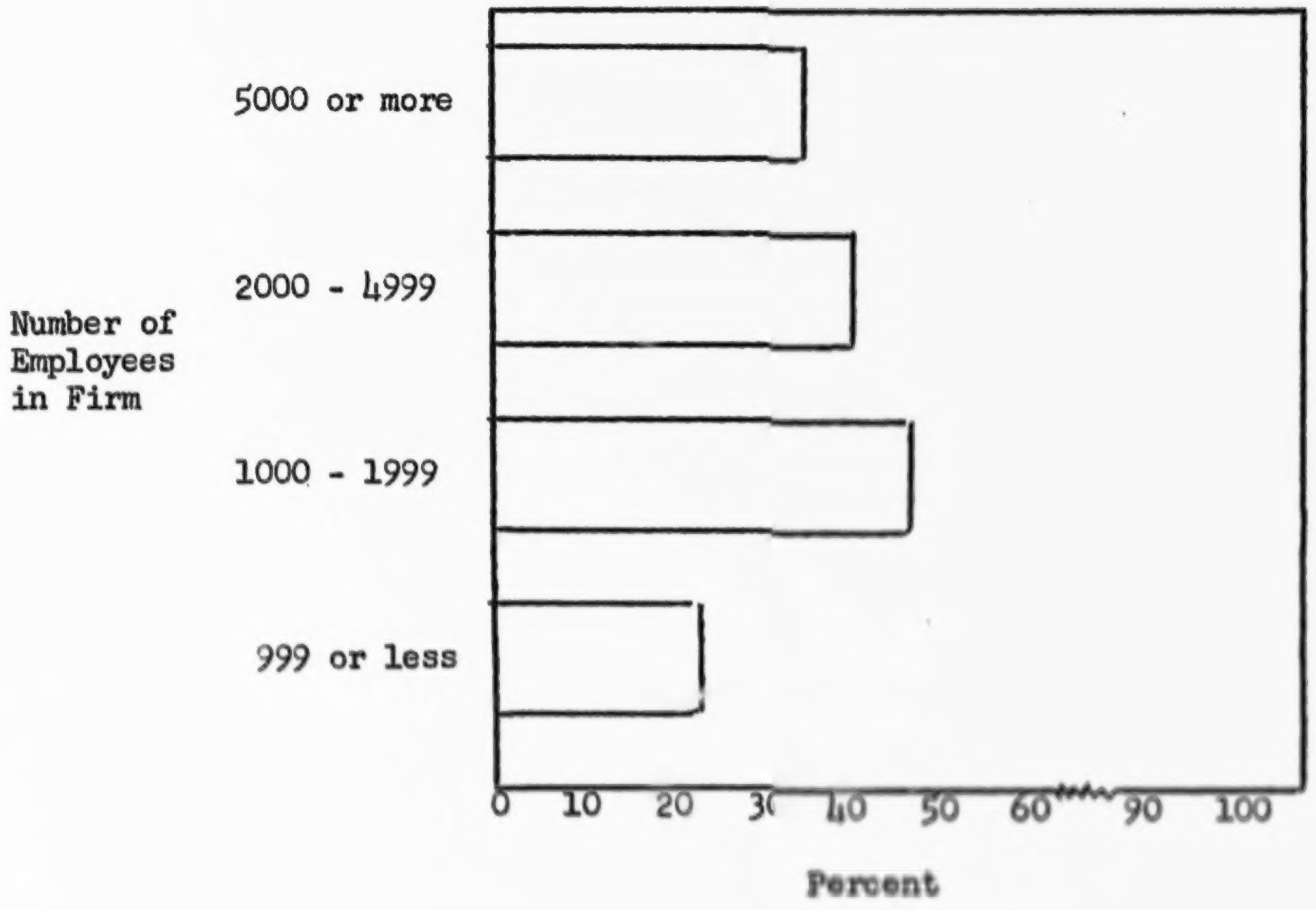


Chart 5

Proportion of Reporting Units
Forecasting Manpower Supply
(by Size)



B. Manpower Forecasting Techniques

Chart 6 is interesting for the eight percent of the firms forecasting only supply and the 43 percent who forecast only demand, when it would seem important to forecast both for effective manpower planning.

Chart 7 shows that 44 percent of the manpower forecasts are prepared by the personnel departments.[4] Forecasting is less likely to be done by the personnel department in manufacturing (38 percent) than in non-manufacturing firms (52 percent), as shown by Chart 8. Chart 9 shows that the greater the number of employees in the reporting unit, the smaller the proportion of forecasts originating in the personnel department--declining from 58 percent in firms with fewer than 1000 employees to 38 percent in those with more than 5000 employees.

Chart 10 shows that industrial sector makes no difference in the 24 percent of forecasts prepared for personnel departments. When size of reporting unit is considered, in Chart 11, there are differences, though without pattern, in the proportion of the recipients which are personnel departments.

The length of time the reporting units have been forecasting manpower needs is shown in Chart 12. It is interesting to see that 41 percent of the firms have been forecasting for ten or more years, if the data are reliable. This may be questioned since no respondent stated that it had been forecasting for six, seven, eight or nine years -- only five or ten!

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[4] Most of the following charts and tables are based on 50 responses; however, the number of respondents represented by certain charts is less because of the failure of some reporting units to complete all parts of the questionnaire. For detailed information on any of the charts, see Appendix C.

Chart 6

Manpower Forecasts
Prepared by
Reporting Units

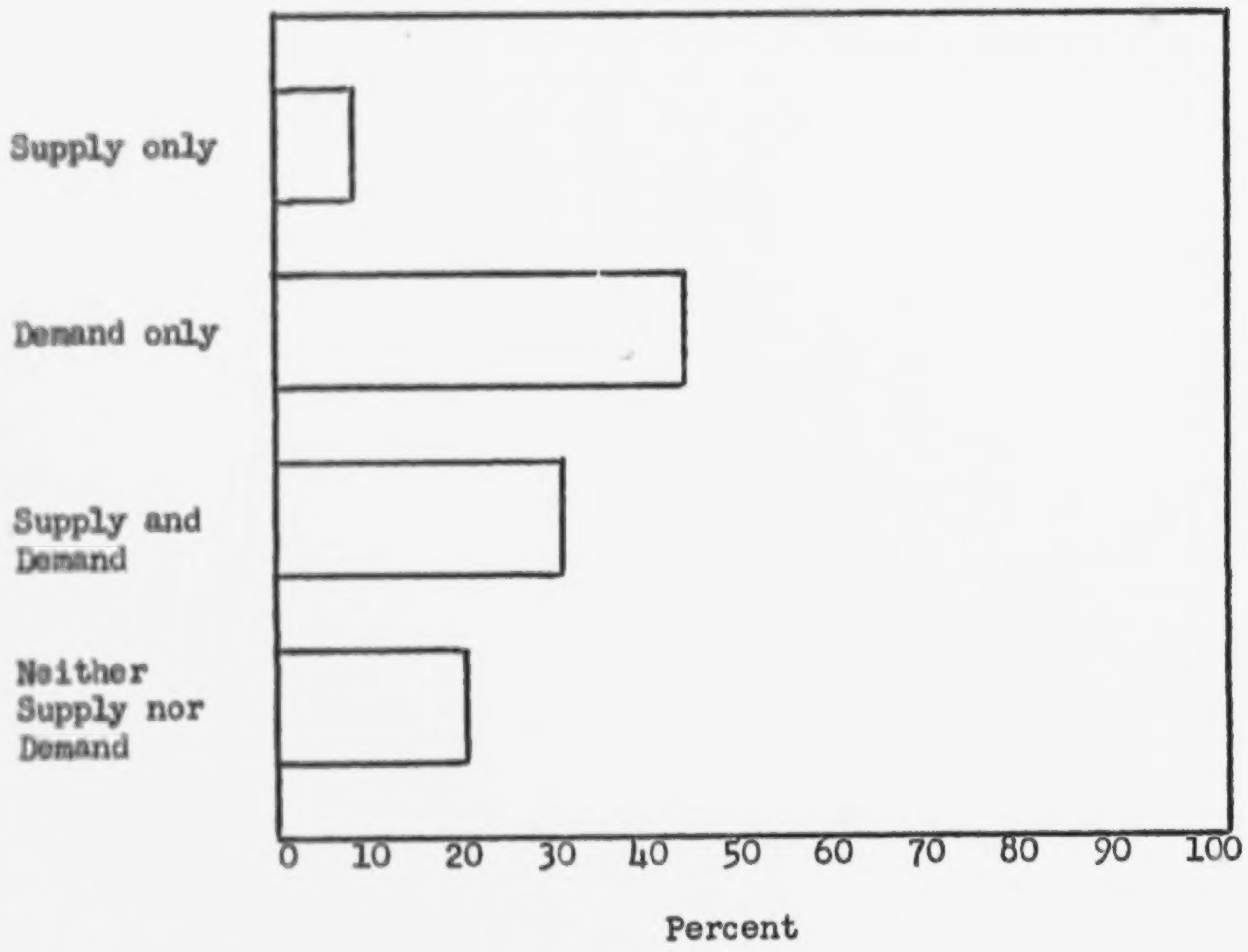


Chart 7

Responsibility for Preparing Forecasts of Manpower Requirements

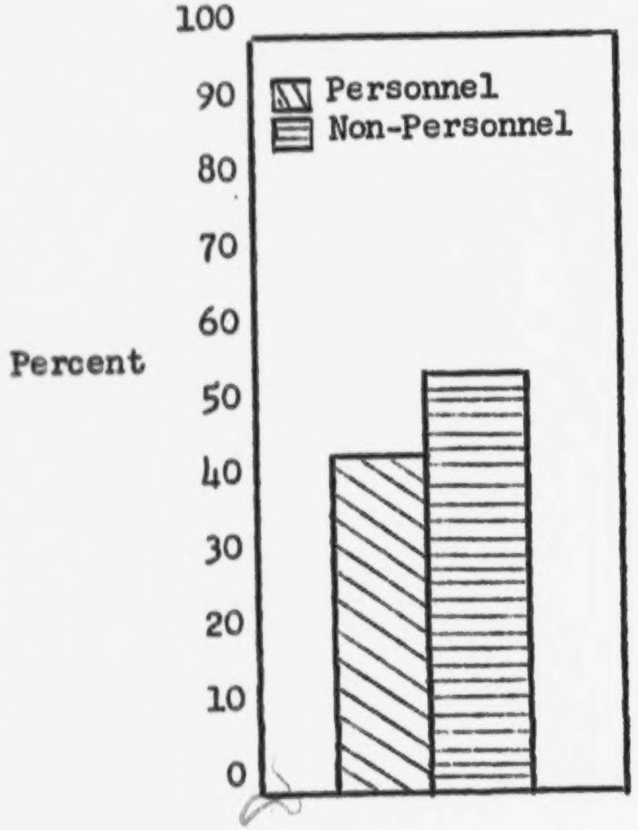


Chart 8

Proportion of Forecasts of Manpower
Requirements Prepared by Personnel
(by Industry)

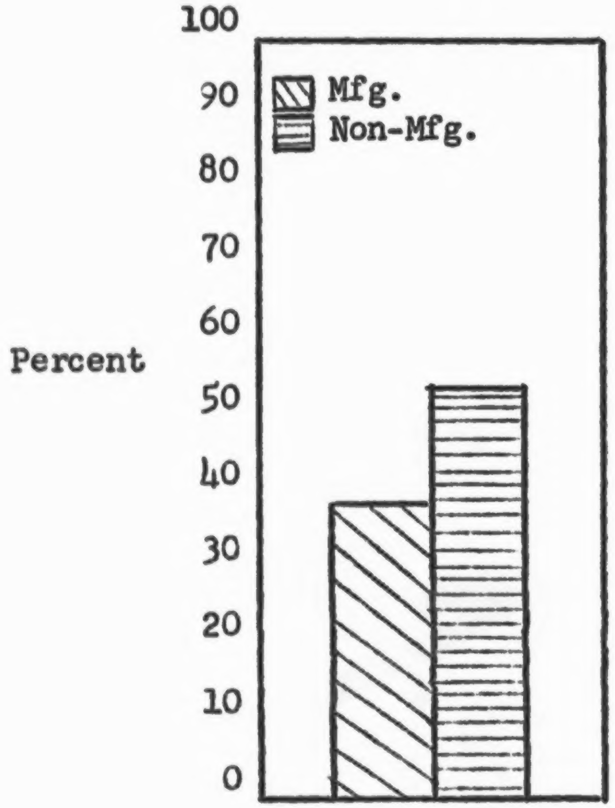


Chart 9

Proportion of Forecasts of Manpower Requirements Prepared by Personnel (by Size)

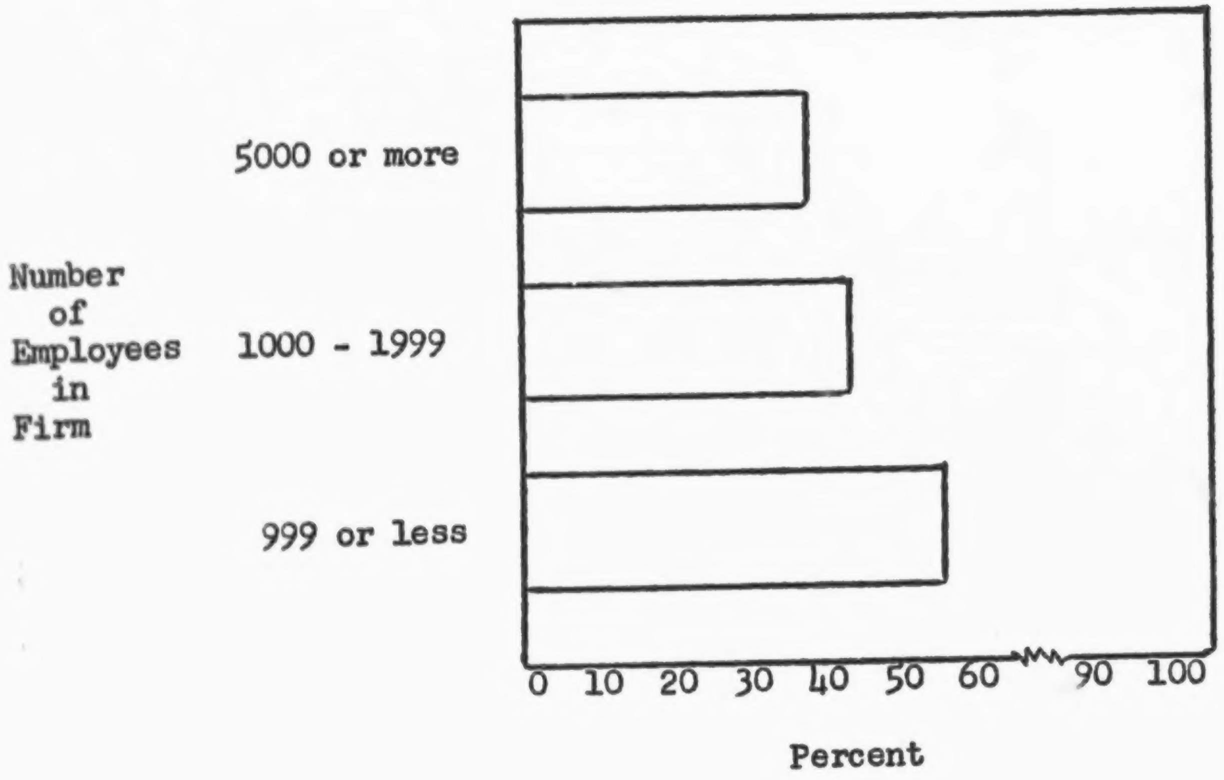


Chart 10

The Recipient of
Manpower Forecasts
(by Industry)

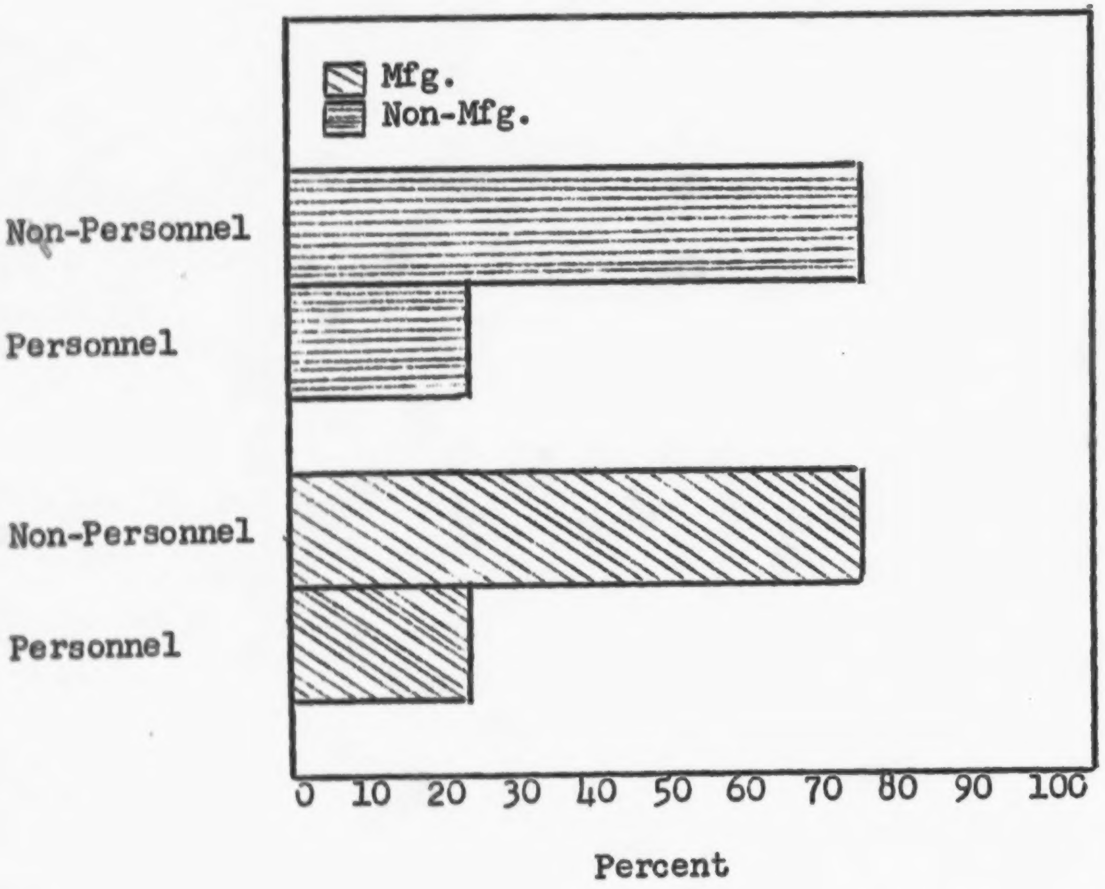


Chart 11

The Recipient of Manpower Forecasts (by Size)

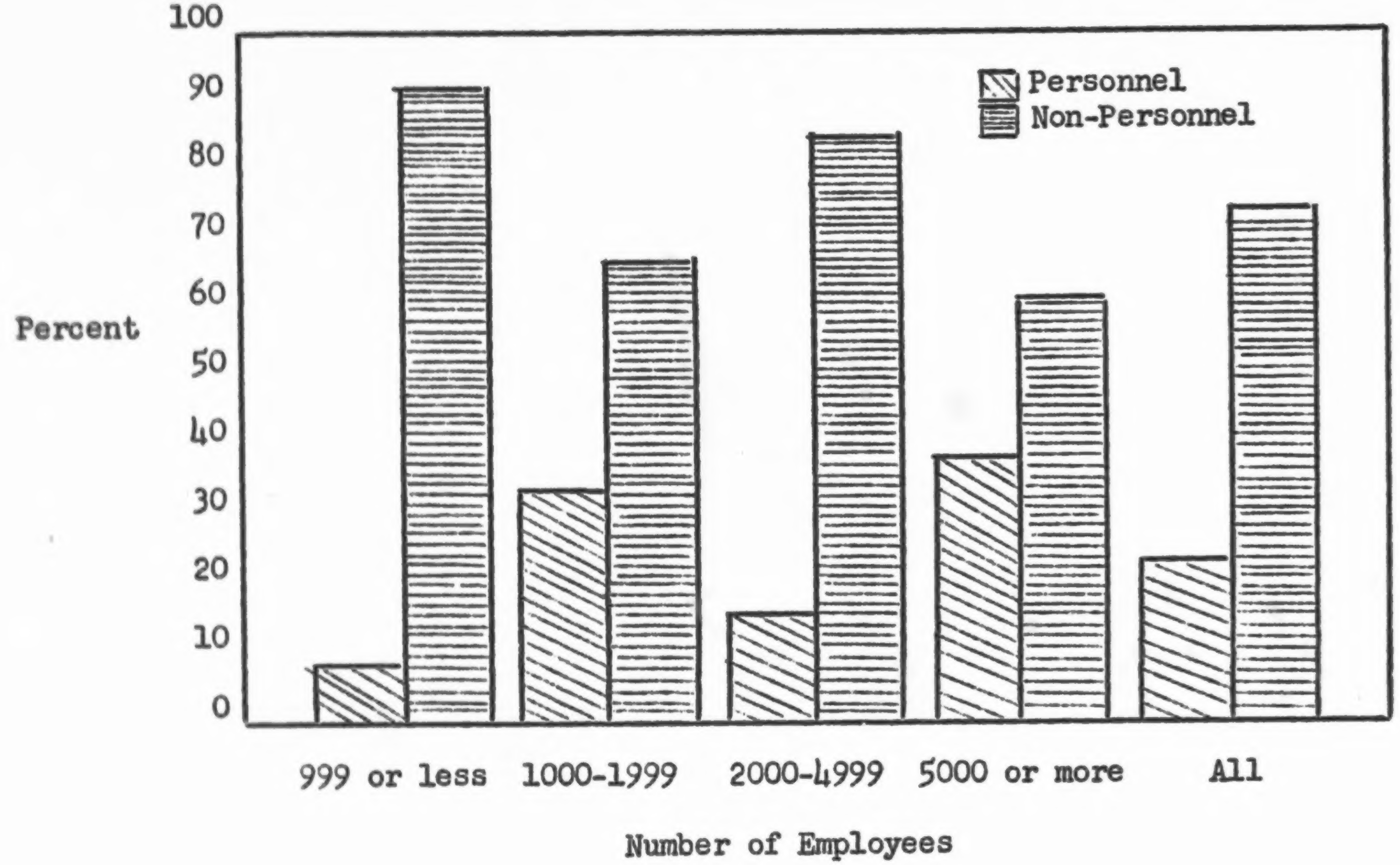
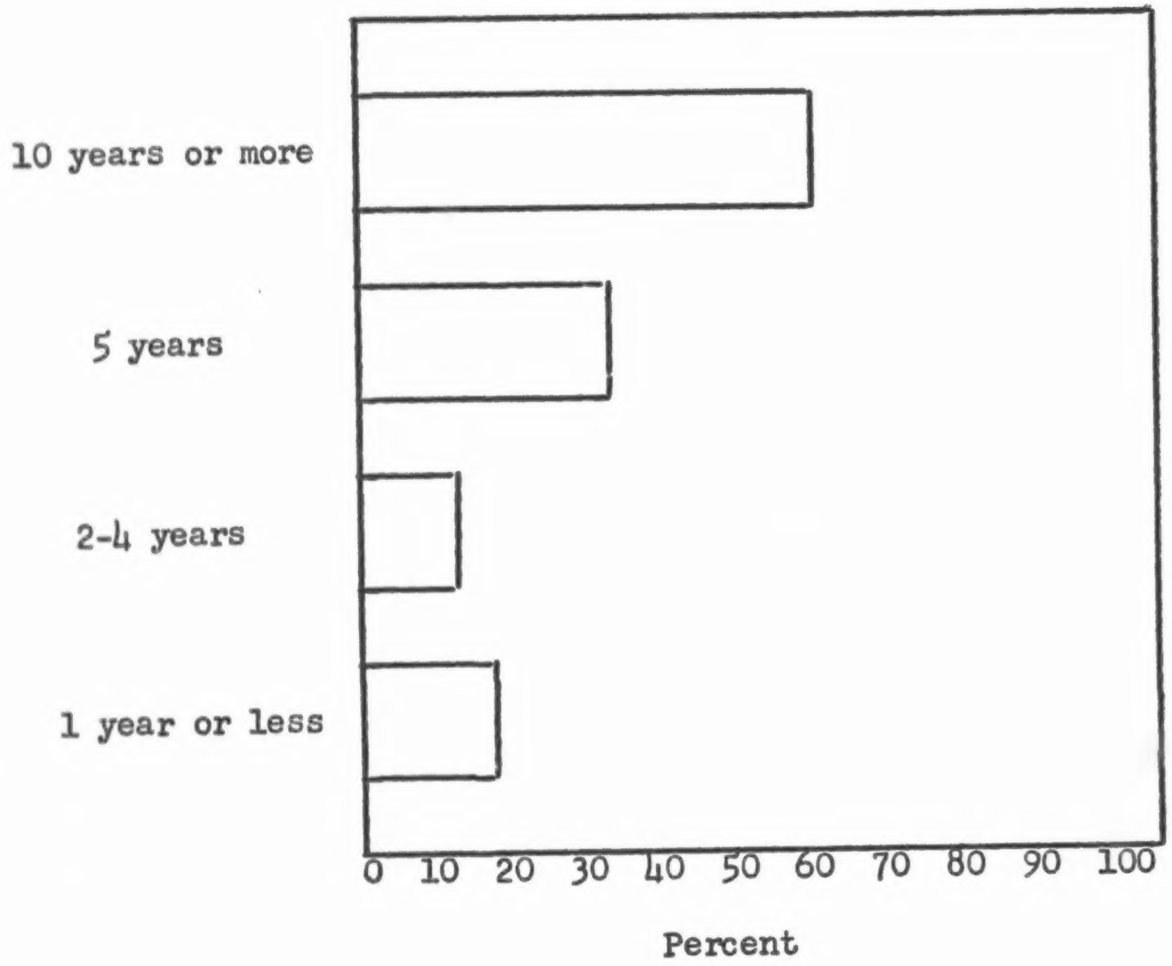


Chart 12

Experience in Forecasting
Manpower Requirements



Two comments should be added to the data shown in Chart 13. First, with few exceptions, those firms forecasting for two or more years (12 percent) also prepare forecasts for one year or less. Second, the modes for the extreme groups, each accounting for 44 percent of the respondents, tended to be at one and five years respectively with few reporting either forecasts of less than one or more than five years.

Table 2 shows that while most reporting units tend to prepare annual forecasts, those in the manufacturing sector tend to forecast manpower more frequently than do those in non-manufacturing industries, where only 24 percent prepare forecasts more often than annually compared to 32 percent for manufacturing.

Chart 14 shows the variety of factors considered by the reporting units. Labor supply refers to external labor supply and certain aspects of internal supply such as development. It is interesting to see that while 62 percent of the reporting units consider sales, only 17 percent consider technological and administrative change despite the emphasis given this factor in the literature. Manufacturers tend to rely on sales more often (70 percent) than do reporting units in non-manufacturing industries (50 percent), as shown in Chart 15. Non-manufacturers reported that 50 percent considered labor supply equally important with sales. Among the factors used less often, Chart 16 shows that manufacturers tend to use new products while non-manufacturers rely more on company objectives.

Except for the 34 percent who forecast for all employees, the most common forecast is the 22 percent who forecast for managerial and administrative personnel, as shown in Chart 17. Chart 18 shows that this does not hold true when the industries are divided by sector. While 38 percent of manufacturing firms forecast all employees compared to 29 percent in

Chart 13

Period Covered by Forecasts
of Manpower Requirements
(Longest Reported)

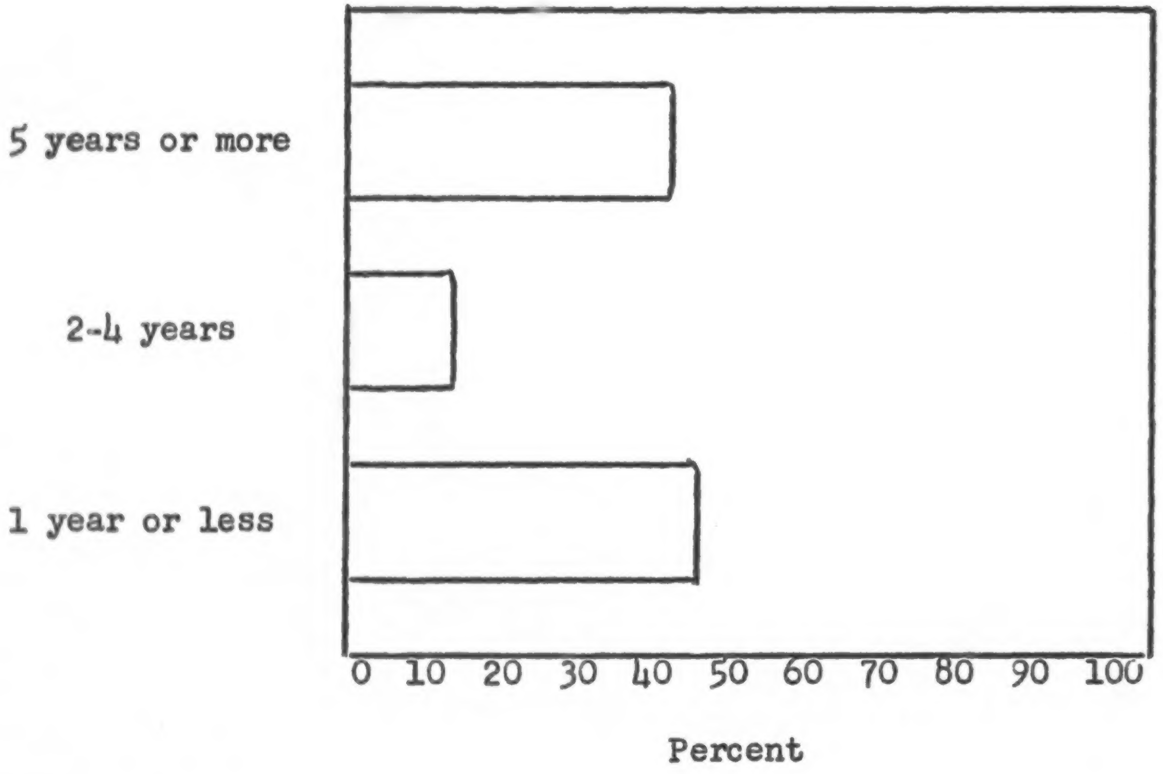


Table 2

Frequency of Preparation
of Manpower Requirement Forecasts
(by Industry)

Industry	Monthly or Less		Quarterly		Semi-Annual		Annual or Longer		Total	
	N	%	N	%	N	%	N	%	N	%
Manufacturing	3	11	4	14	2	7	19	68	28	100
Non-Manufacturing	0	0	1	5	4	19	16	76	21	100
All Reporting Units	3	6	5	10	6	12	35	71	49	100

Chart 14

Factors Used to Predict
Manpower Requirements

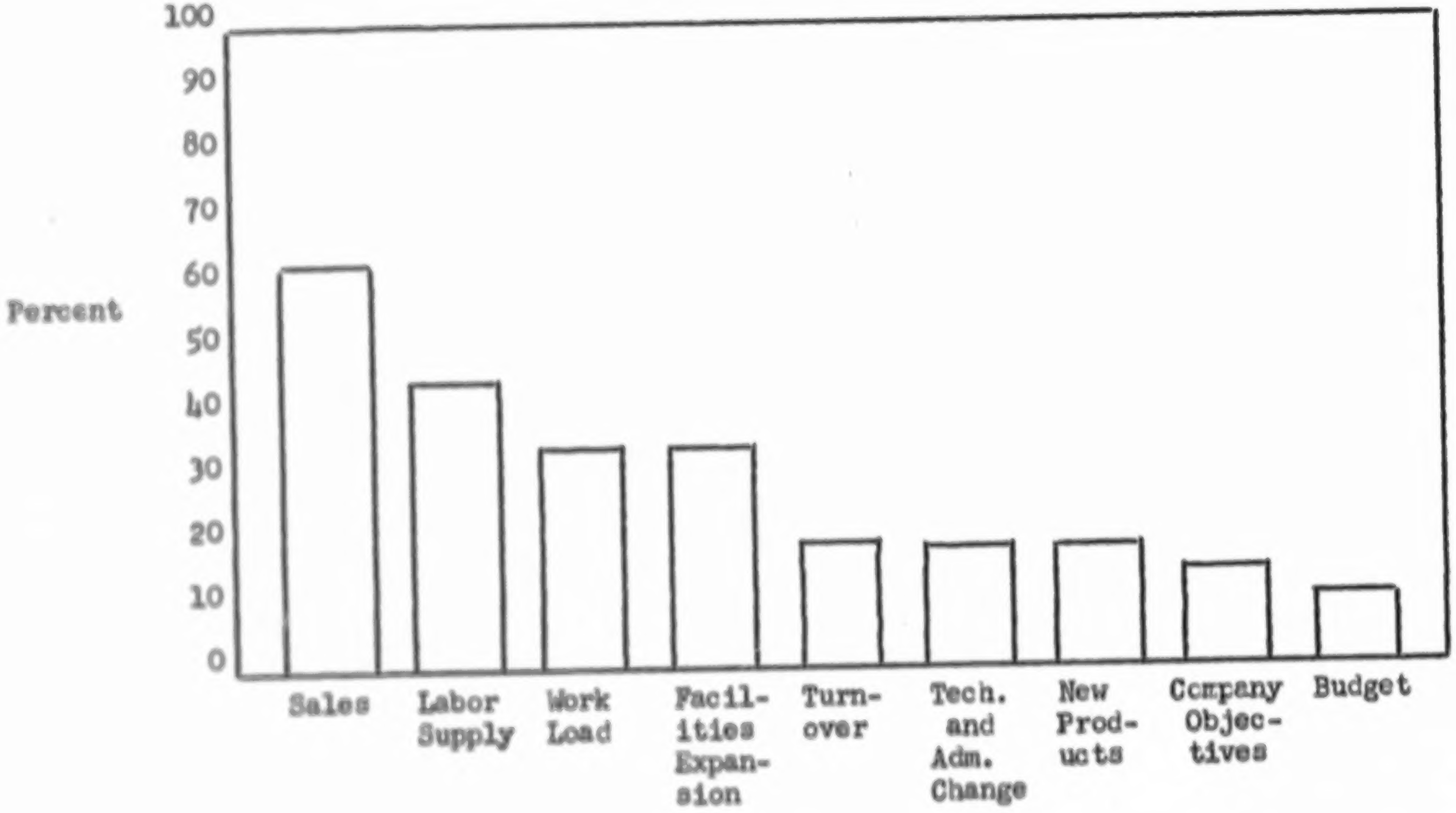


Chart 15

Factors Used to Predict
Manpower Requirements
(by Industry)

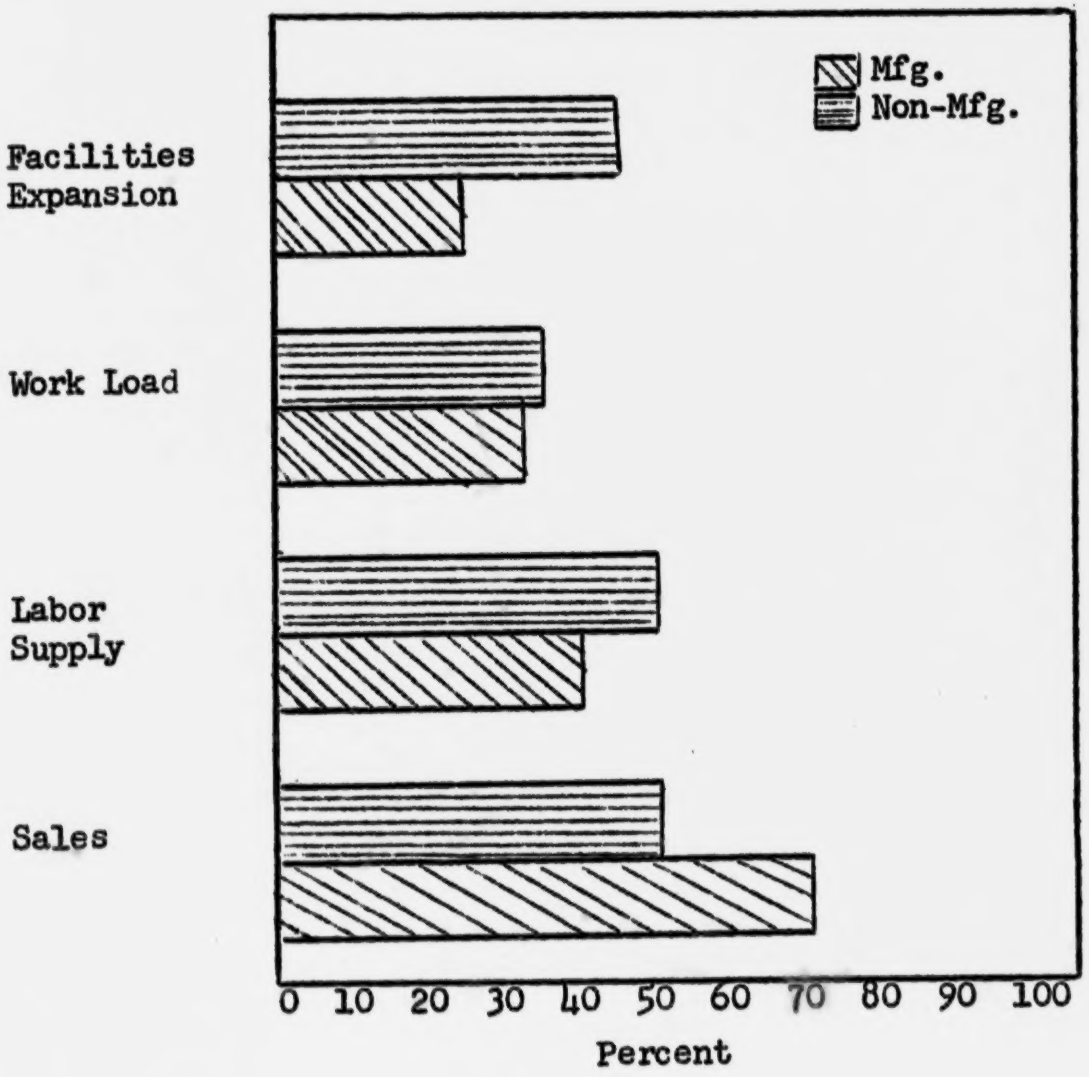


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Chart 16

Factors Used to Predict
Manpower Requirements
(by Industry)

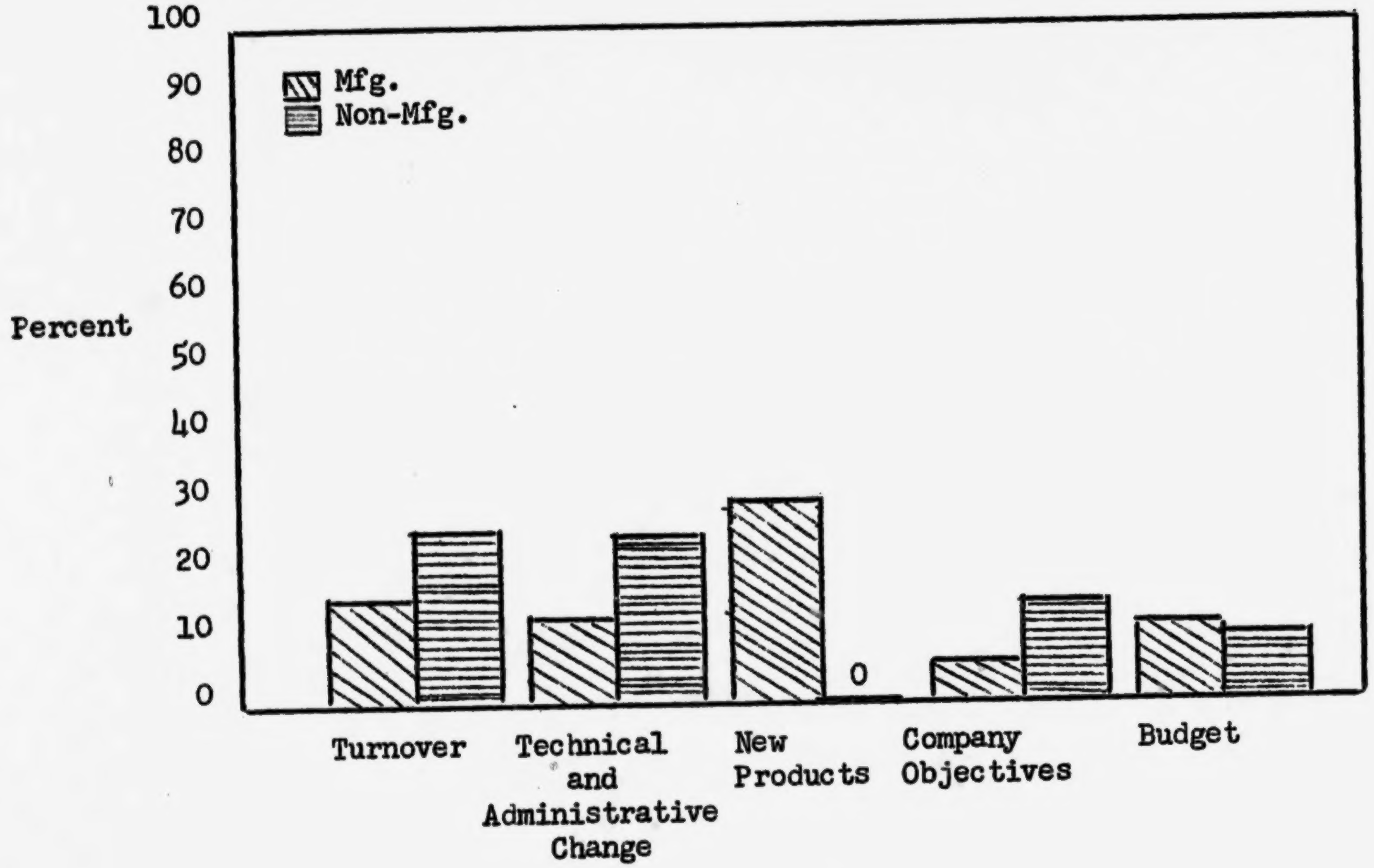


Chart 17

Occupational Groups for Which
Manpower Forecasts are Prepared

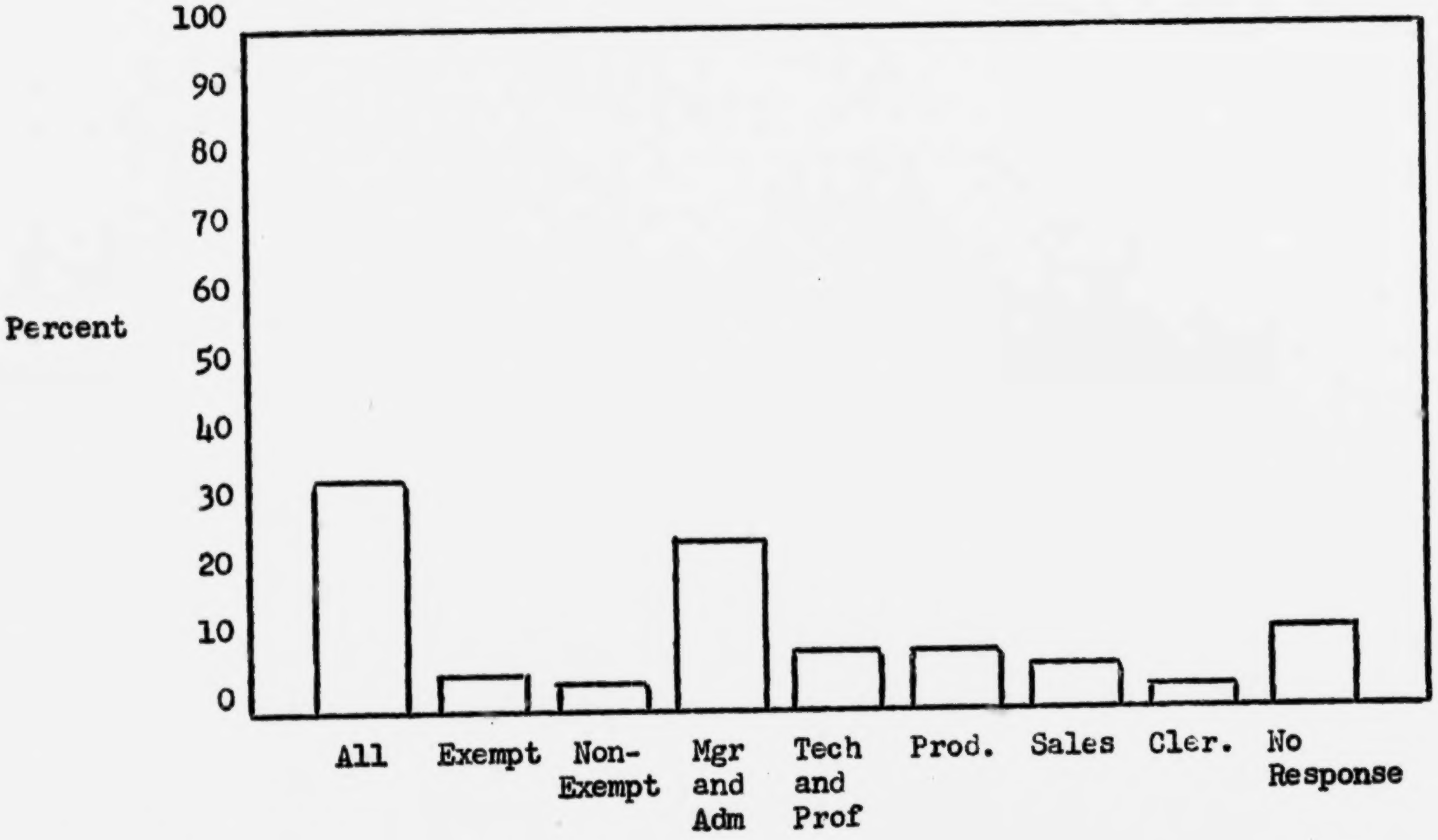
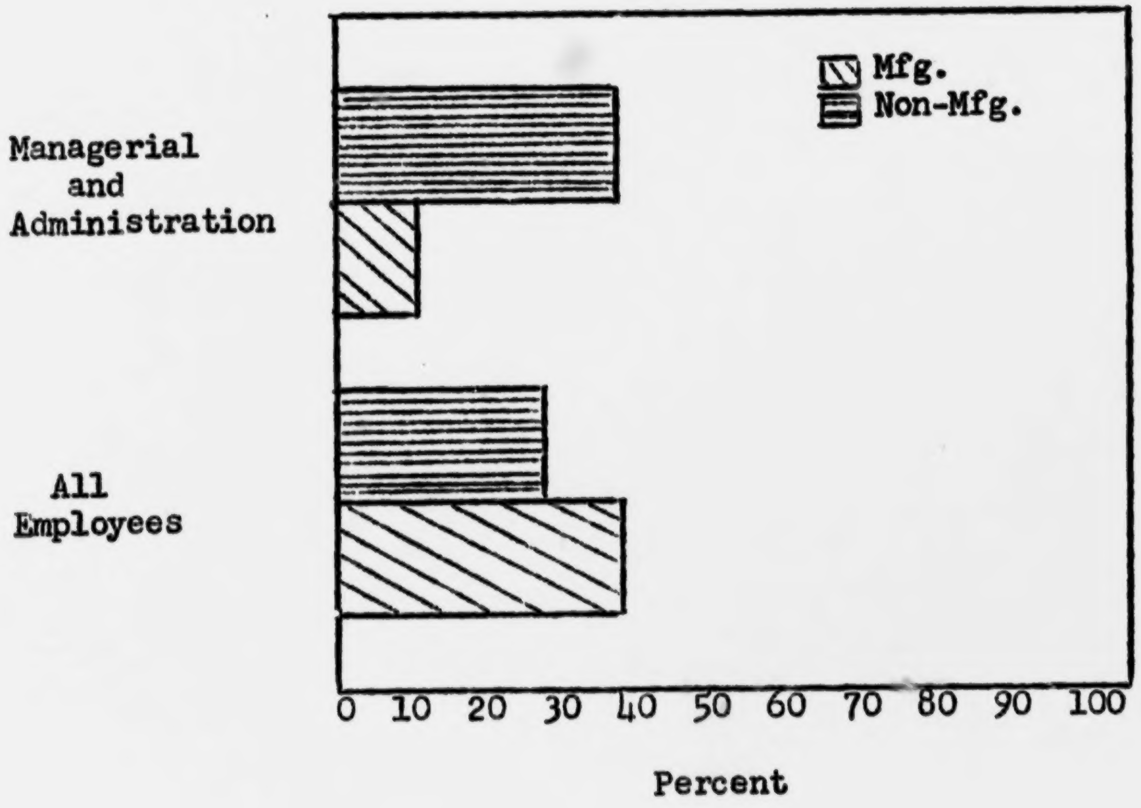


Chart 18

Occupational Groups for Which Forecasts are Prepared (by Industry)



non-manufacturing, only 10 percent of manufacturers forecast for managerial and administrative personnel compared to 38 percent for non-manufacturing.

C. Problems of Manpower Forecasting

Chart 19 shows the uses of manpower forecasts. It is surprising to find how few units use forecasts to aid in planning for physical facilities (11 percent), for production (11 percent), or for expansion and acquisitions (4 percent). Also surprising is that only 36 percent and 30 percent respectively relate manpower forecasts to training and to transfer and promotions --key areas in manpower planning. Notice in Chart 20 that short-range forecasters are least likely to use their manpower projections for financial plans, for training, and for transfers and promotions. It would appear from this contrast that short-range forecasters tend to buy their manpower needs while long-range forecasters tend to plan for and develop their resources internally.

Chart 21 shows other types of forecasts prepared by those reporting units which forecast manpower requirements. It seems strange that while so many respondents prepare other types of forecasts, they do not appear to relate them to manpower forecasts as was shown in Chart 19.

Chart 22 shows how reporting units react to errors in manpower forecasts. Regardless of the direction of the error, over 80 percent adjust manpower. In case of an underestimate of manpower requirements the most common adjustment is to accelerate hiring, and when requirements are overestimated the typical reactions are to slow or stop hiring and to lay employees off (see Charts 23 and 24).

Chart 19

Uses of Manpower Requirement Forecasts

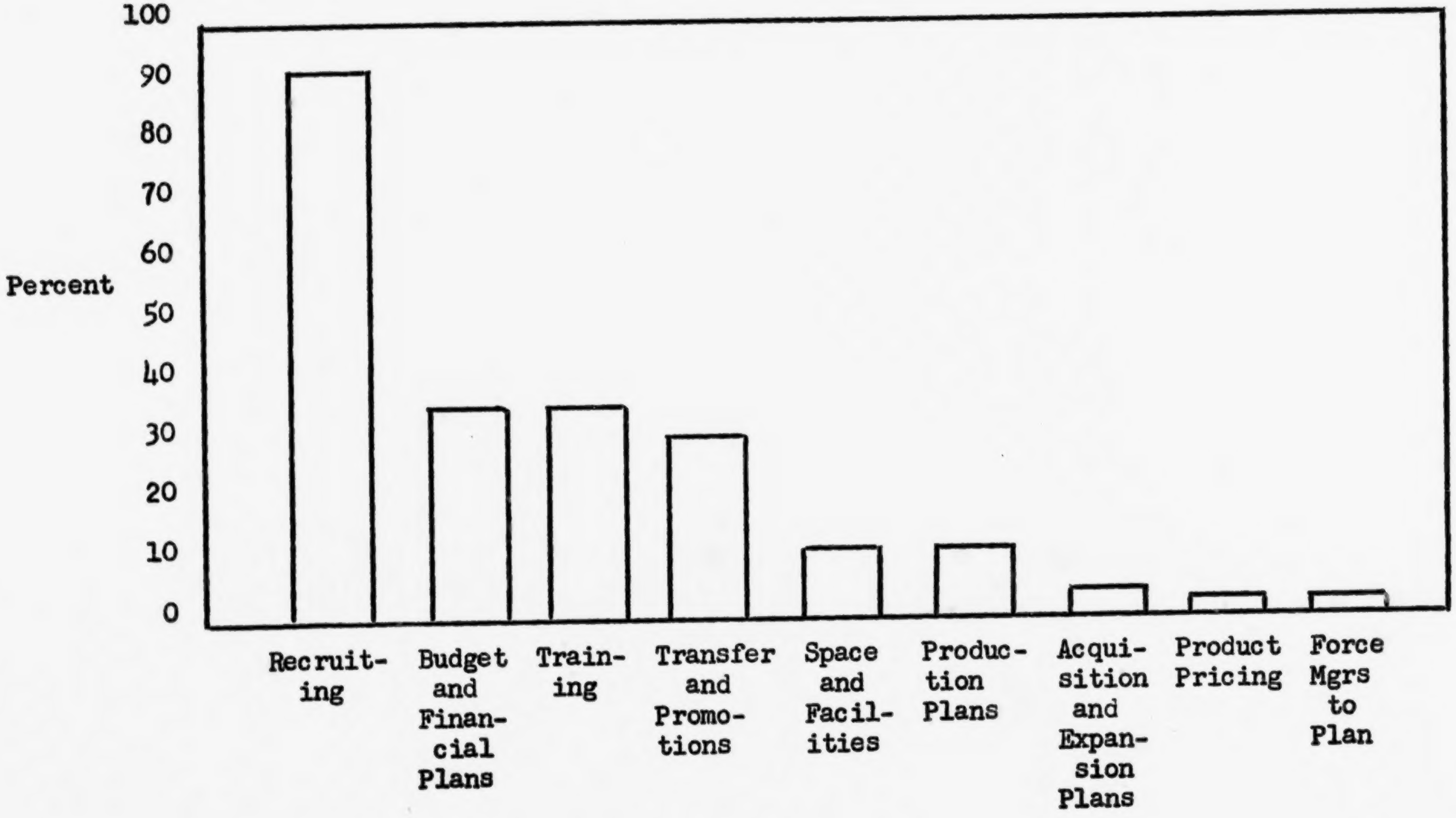


Chart 20

Utilization of Manpower
Requirement Forecasts by
Length of Forecast Period

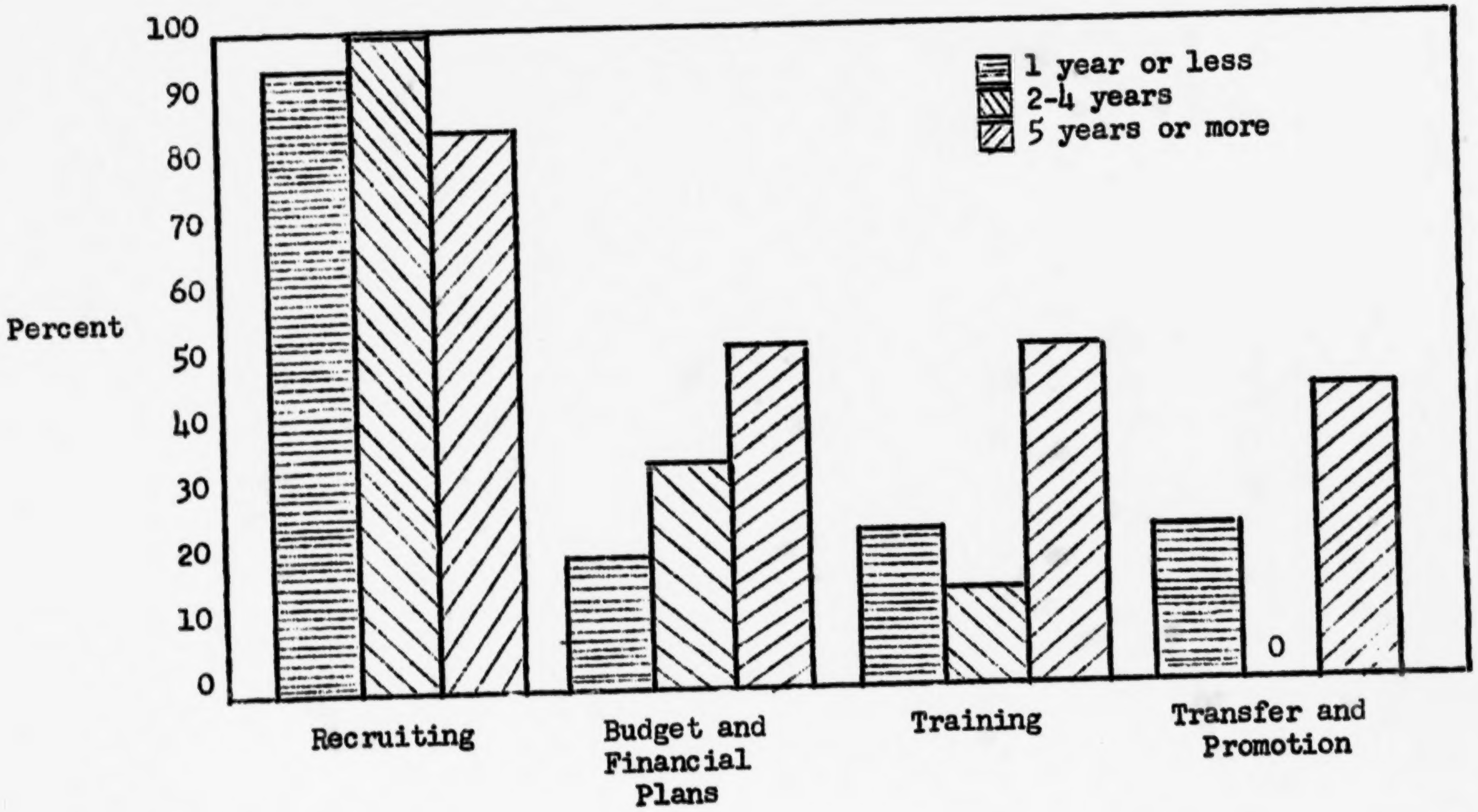


Chart 21

Other Forecasts Prepared by the
Reporting Units Making
Forecasts of Manpower Requirements

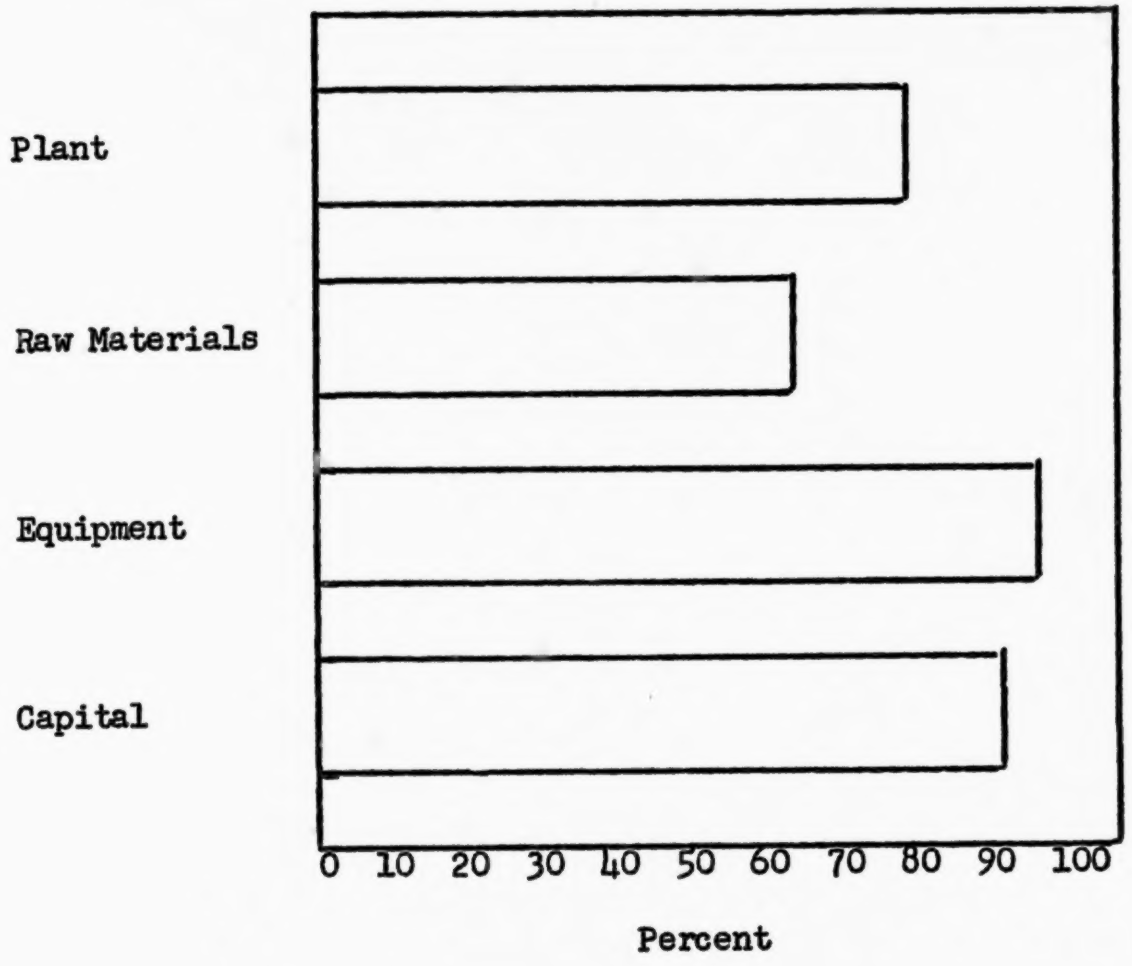


Chart 22

Actions Taken in the Event of an Error in Forecasting Manpower Requirements

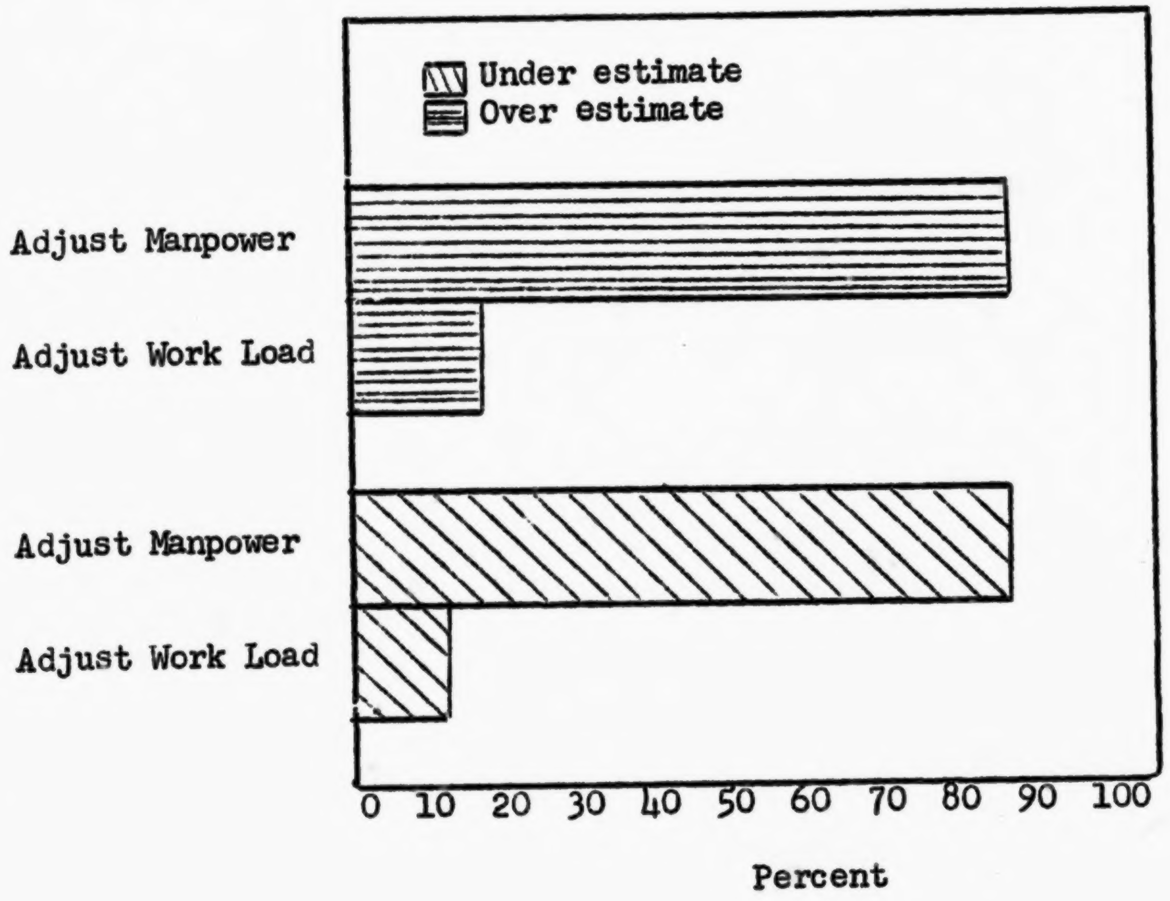


Chart 23

Manpower Adjustments when
Requirements Are Underestimated

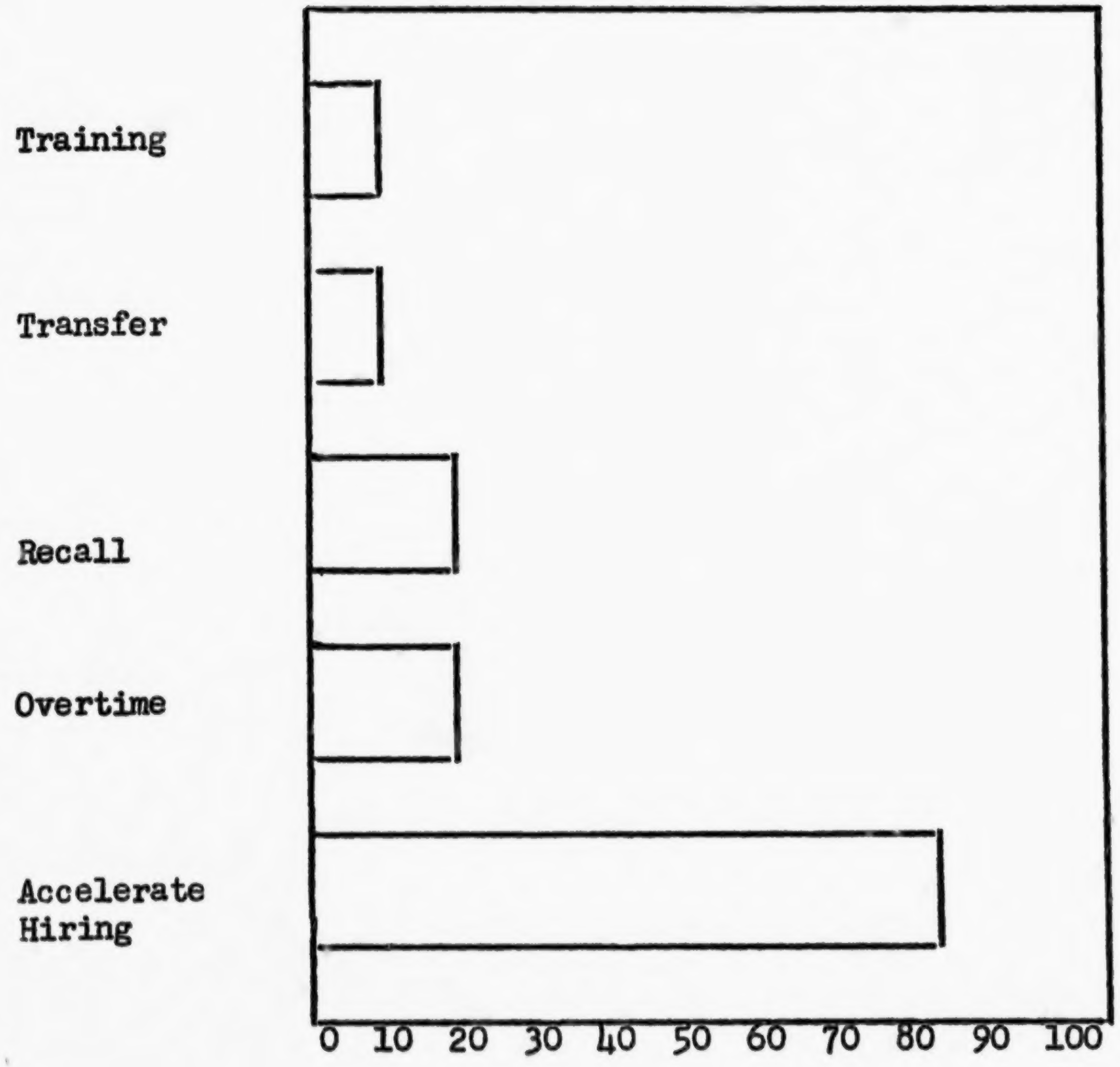
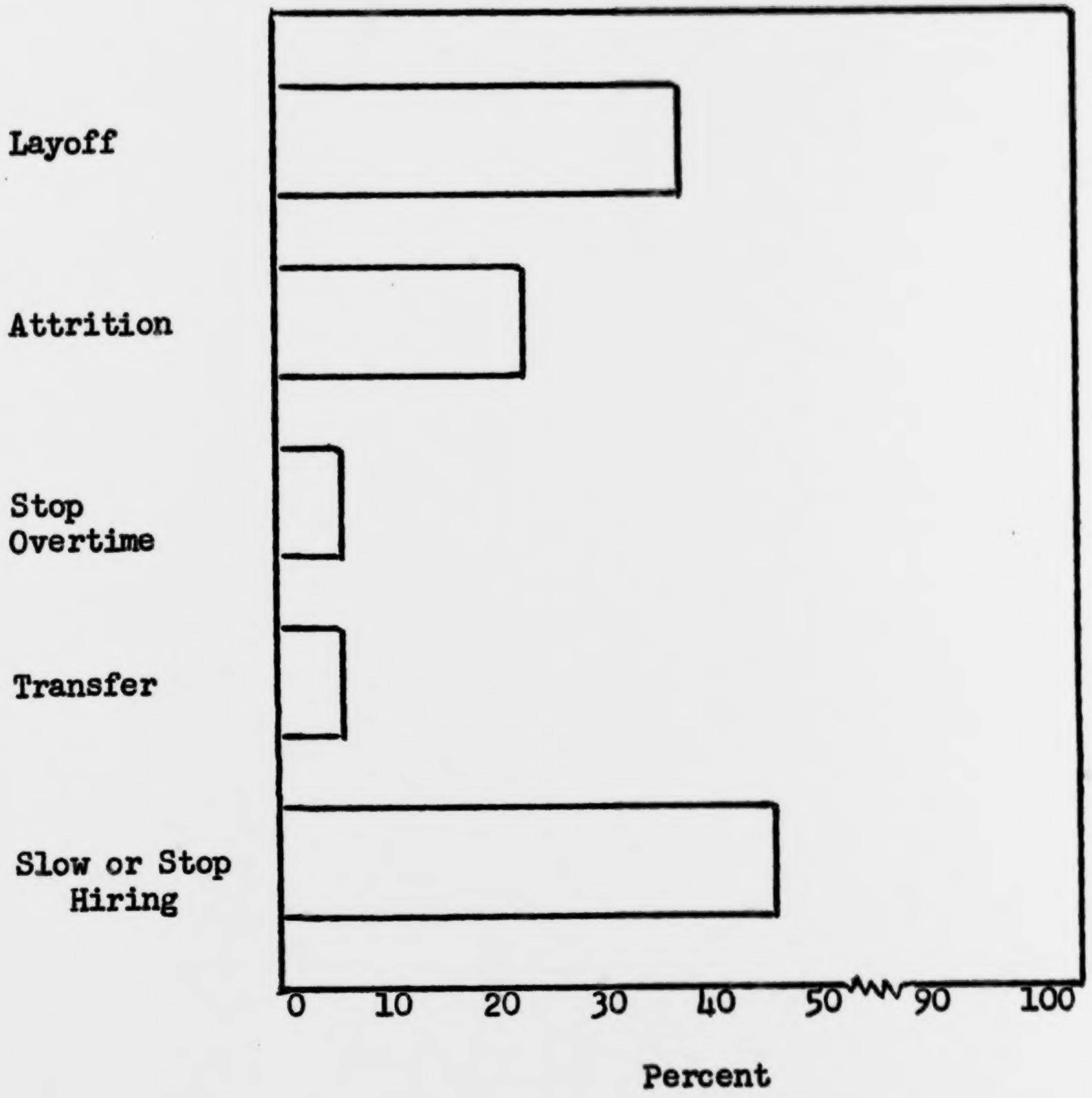


Chart 24

Manpower Adjustments when Requirements are Overestimated



The most difficult occupational group for which to project requirements are compared in Chart 25. In both manufacturing and non-manufacturing firms "managerial requirements" appear to be most difficult to project. A greater emphasis on research and development activities in manufacturing firms may explain why 1/3 of those in manufacturing state that professional and technical needs are most difficult to forecast, while no non-manufacturer reports that demand for this group is most difficult to project.

Chart 26 reports categories of information which our respondents feel would enhance the accuracy of manpower forecasts. The discouraging finding is that a lack of knowledge of company plans and objectives is the most common need. Apparently the individual with the responsibility for forecasting a firm's requirements for its most important resource too often does not have access to company plans.

A number of manpower and product forecasts are prepared by various government agencies and private organizations. About 20 percent of our respondents refer to some forecast or forecasts prepared by outside organizations when projecting their own manpower requirements. Charts 27 and 28 indicate there is no clear relationship between either industry sector or size of unit and use of forecasts made by other organizations. Apparently such forecasts are too general or do not deal with the appropriate factors to be of value to an organization engaged in forecasting its manpower requirements.

Over 90 percent of those responding indicate that the person forecasting manpower requirements survey managers, foremen or other personnel when preparing the projections. The data reported in Charts 29 and 30 indicate that neither size nor industry sector is related to the frequency of this practice.

Chart 25

Most Difficult Occupations to Forecast
(by Industry)

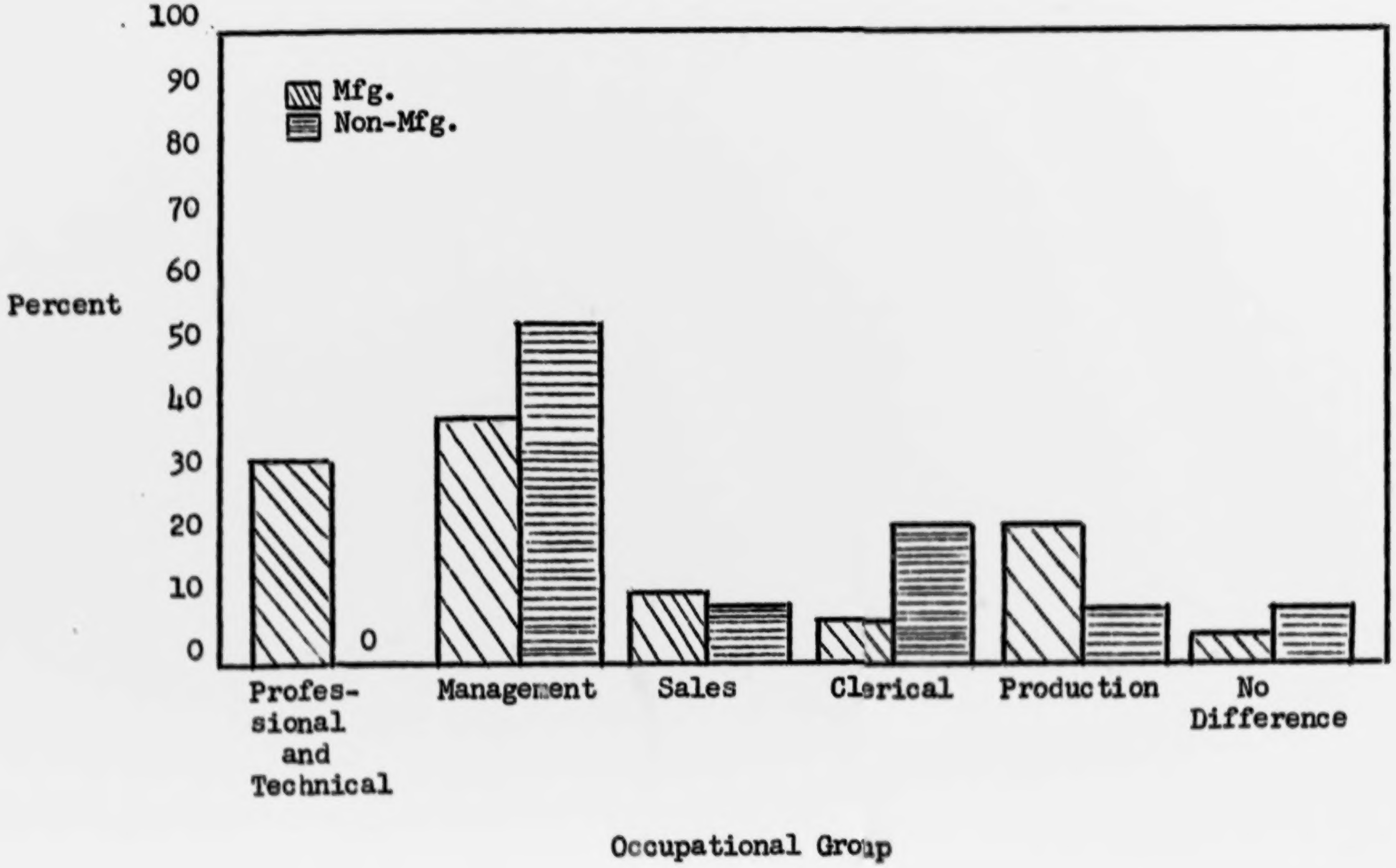


Chart 26

Additional Information Which Would be Helpful for Accurate Manpower Forecasting

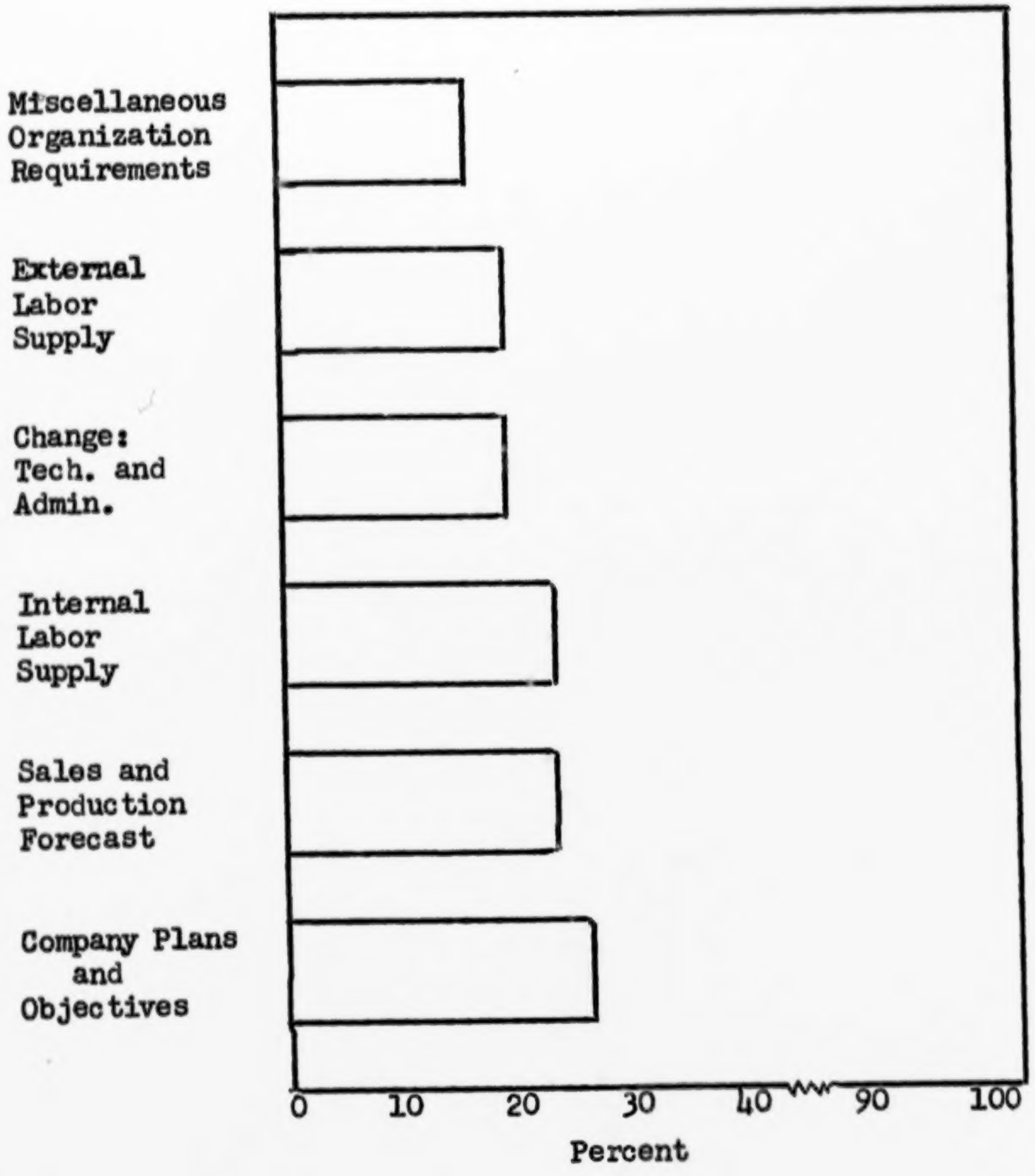


Chart 27

Use of Forecasts Made by Other
Organizations in Making Manpower Forecasts
(by Industry)

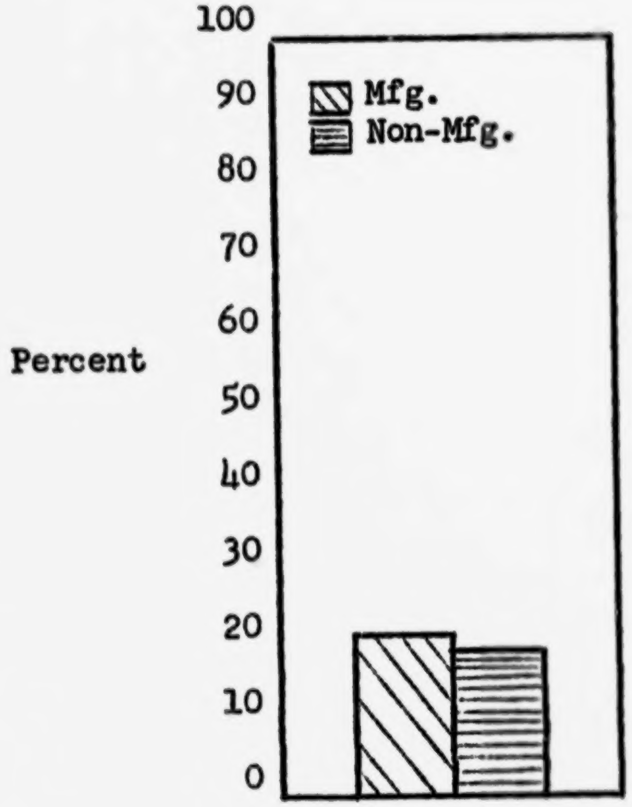


Chart 28

Use of Forecasts Made by Other
Organizations in Making Manpower Forecasts
(by Size)

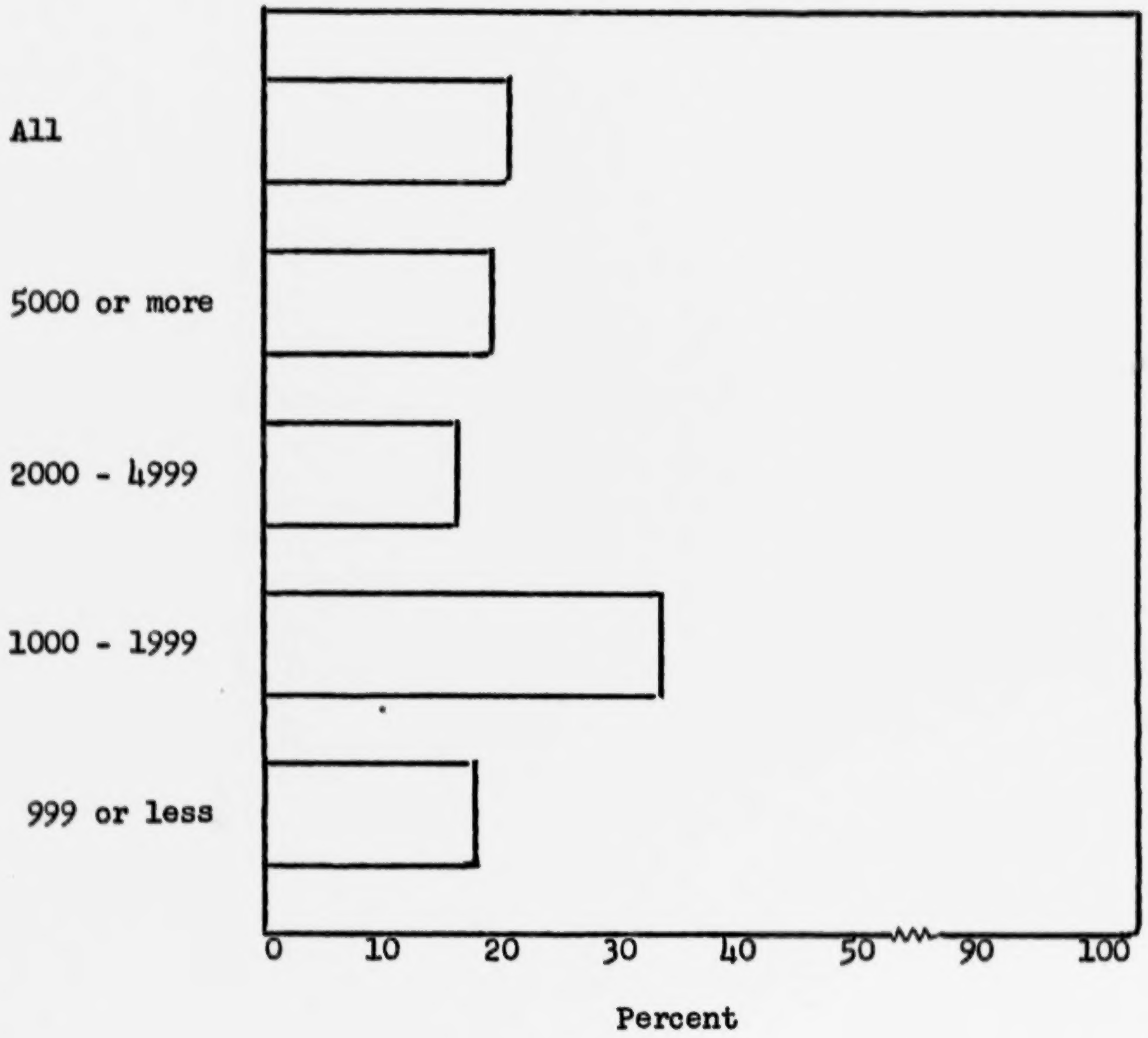


Chart 29

Managers, Foremen and Other Personnel Are Surveyed in Determining Manpower Needs (by Industry)

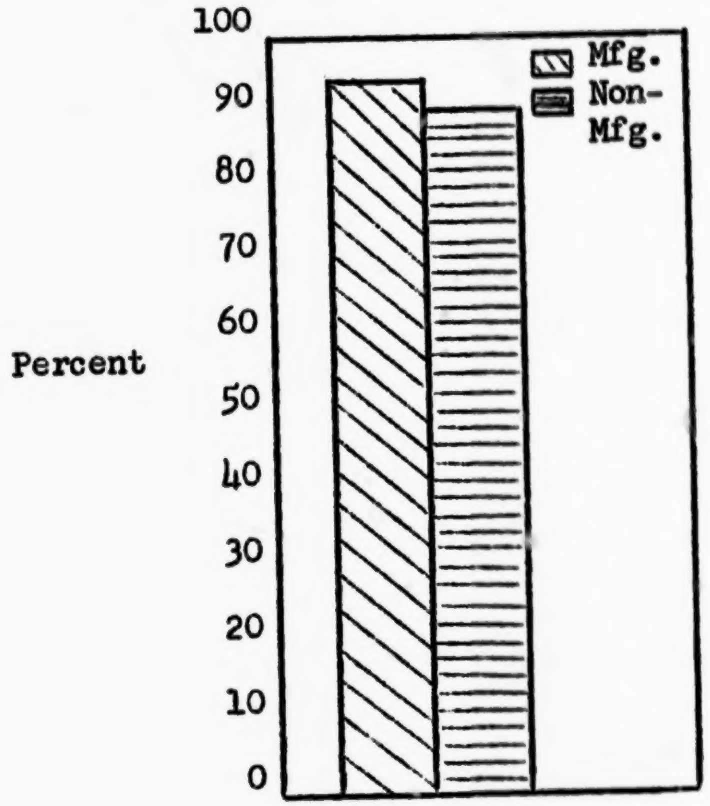


Chart 30

Managers, Foremen and Other Personnel Are Surveyed in Determining Manpower Needs
(by Size)

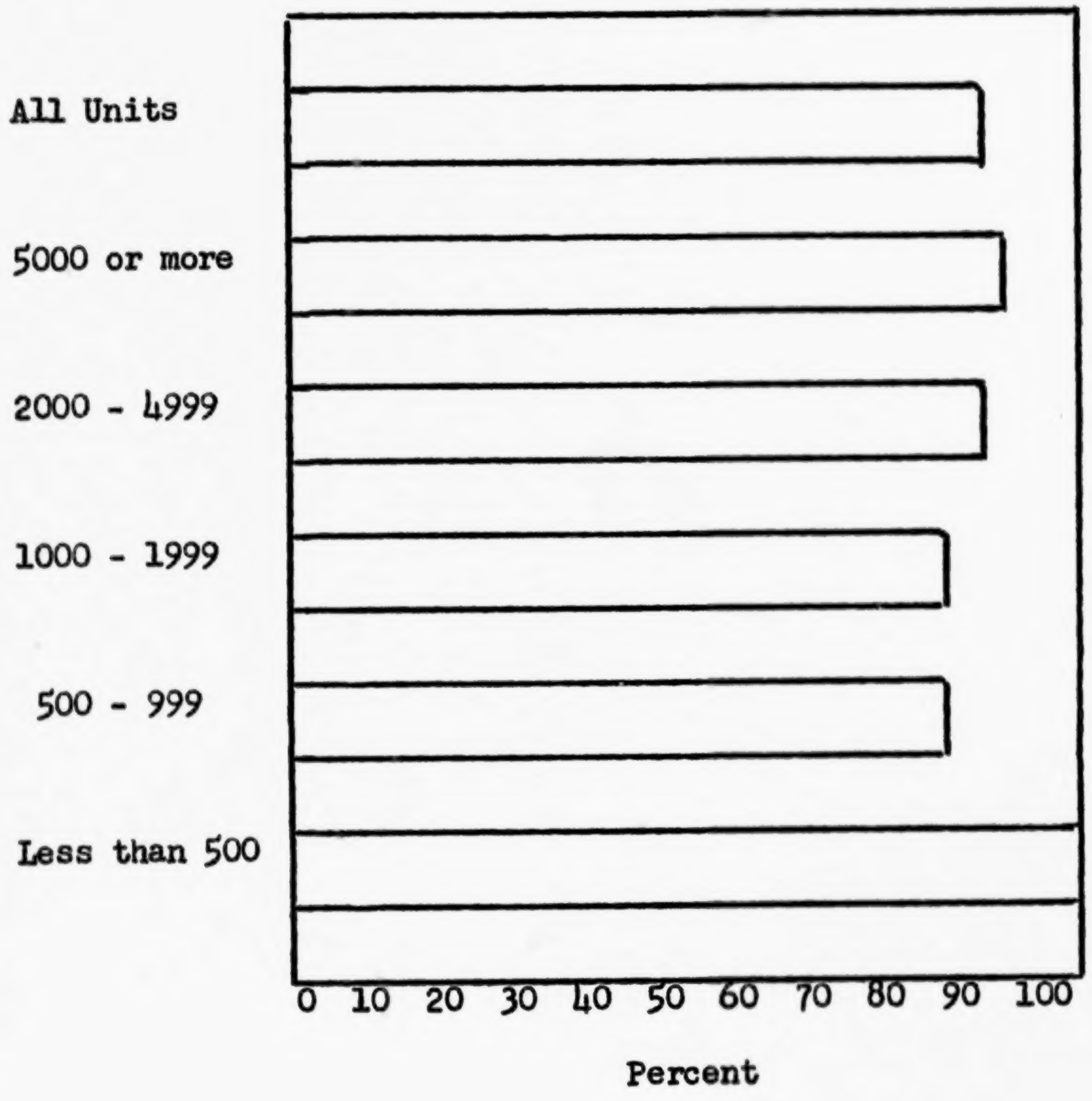


Chart 31 reports the proportion of respondents which maintain records of number of employees by occupation, separations and hires by occupation and age by occupation. This information is basic to understanding the nature of an organization's internal labor supply, which in turn is necessary to forecast manpower requirements. Surprisingly not all respondents maintain such records. Table 3 demonstrates that number of employees is not consistently related to the maintenance of such records.

D. Evaluation of Forecasting

1. Interview Results

In our questionnaire we did not ask for information about forecast accuracy since this may be a sensitive topic which would tend to reduce the proportion of returns. Instead questions of accuracy were to be covered in an interview setting. The results indicated below show that systematic records of accuracy are generally not maintained, and that any estimates of accuracy gathered by a questionnaire would have been misleading.

Of the 25 respondents which were interviewed, only three regularly check the accuracy of their forecasts. These are cases 13, 15 and 16 and in Appendix D. Respondents 13 and 16 indicated that their annual forecasts were usually within one or two percent of actual requirements. Respondent 15's annual forecasts are usually within five percent of actual requirements.

Among the others which were interviewed, the typical response was that the short-range forecasts of one year or so are pretty accurate, and the longer-range forecasts are not too good. When pressed for a more definite answer, it was stated that accuracy data is not maintained. Usually the interviewees would estimate that the one and two year forecasts were within

Chart 31

Additional Records Kept
by Reporting Units

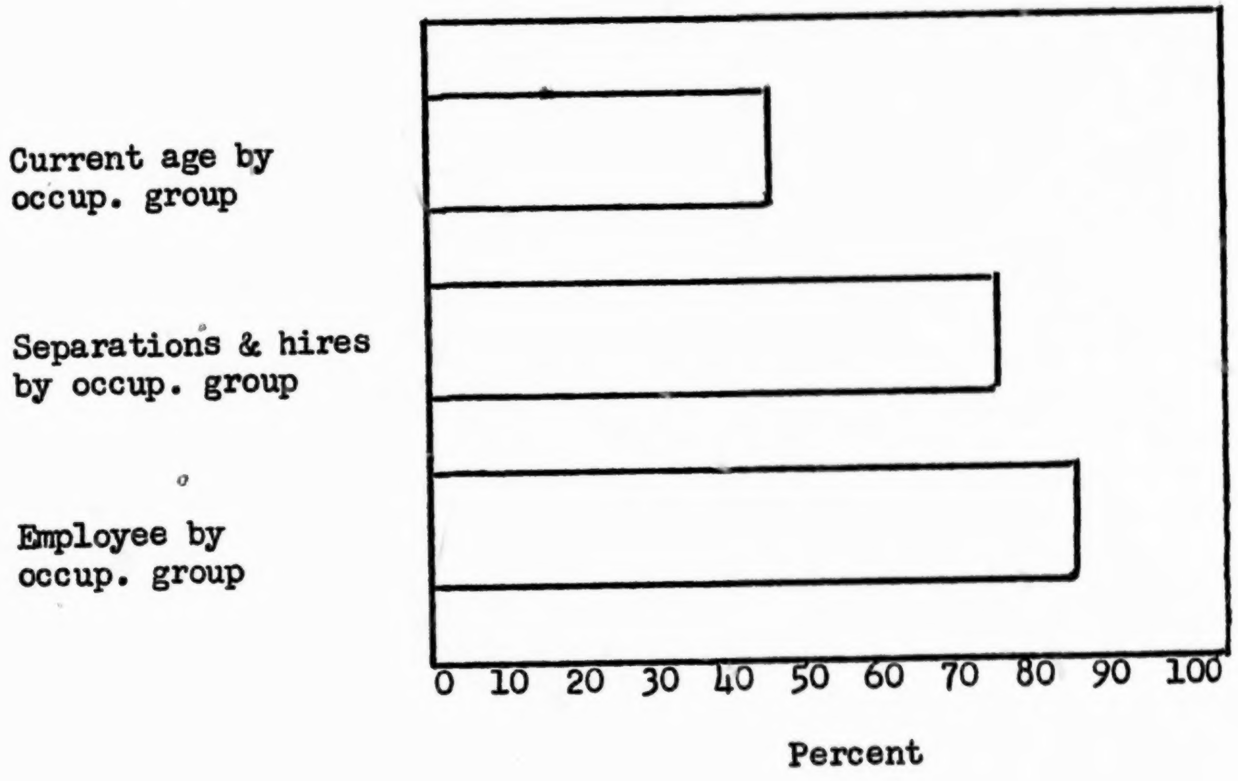


Table 3

Additional Records Kept by Reporting Units
(by Size)

Number of Employees	TYPES OF RECORDS											
	Employee by Occup. Group				Separations and Hires by Occup. Group				Current Age by Occup. Group			
	Yes		No		Yes		No		Yes		No	
	N	%	N	%	N	%	N	%	N	%	N	%
999 or less	12	100	-	-	10	83	2	17	4	33	8	67
1000-1999	7	78	2	22	6	67	3	33	6	67	3	33
2000-4999	12	92	1	8	11	85	2	15	6	46	7	54
5000 or more	11	69	5	31	11	69	5	31	6	38	10	62
All	42	84	8	16	38	76	12	24	22	44	28	56

five to ten percent of actual requirements and the three to five year forecasts were within 15 to 25 percent of actual requirements.

Two points regarding accuracy became clear during this research project. First, many of those interviewed typically were not concerned about accuracy of forecasts when defined as a comparison of forecasted requirements and actual requirements. Rather their concern seemed to be whether the number employed at a point in time matched requirements at that time, regardless of some earlier forecast. This suggests that for some organizations, forecasting requirements may be an exercise, the only value of which is to provide a general guide for recruiting, and other aspects of manpower planning such as planning training, promotions and transfers are disregarded.

The second point focused upon the use of forecasts as a control device. If the only way a manager can expand or contract his work force is to have forecasted that manpower change then the forecasts will artificially appear to be accurate. A number of our respondents relate manpower forecasts to wage and salary cost controls. It is quite possible that an artifical type of forecast accuracy is involved in these instances. In evaluating the accuracy of different techniques of forecasting, those forecasts used as a control must be separated from those which, because of the use made of them, are not automatically accurate.

The researchers feel the above information is inadequate to make an evaluation of the accuracy of specific techniques currently used. However, the information does seem to justify the conclusion that the forecast accuracy of current techniques, in general, needs to be improved. The most pressing matter pertaining to this topic at this time appears to be for firms to systematically identify the accuracy of their approaches to manpower forecasting.

2. Comparison of Accurate and Inaccurate Forecasters

Thirty-four firms which participated in the Twin Cities Area Skill Survey were sent questionnaires.[5, 6, 7] Twenty-two of these responded and eleven of the 22 prepare forecasts of manpower requirements. Contrasted to the total sample, the response rate is almost identical, 65 percent for the total and 64 percent for this subset. However, 72 percent of the entire sample prepare forecasts of manpower needs compared to the 50 percent here. Since size is positively related to forecasting, it is possible that this explains the discrepancy because the median number of employees in these organizations is 1100 compared to 1500 for the total sample.

Data from the Skill Survey makes available some evidence for two relevant questions. First, are those respondents which formally prepare manpower forecasts more accurate in estimating their future employment? Second, are organizations which have experienced greater changes in employment more likely to forecast their manpower requirements?

---

5. Appendix A contains a detailed discussion of this investigation's methodology. In that section it is stated that our initial intention was to restrict the sample to organizations participating in the Twin Cities Area Skill Survey. It is pointed out that the number of such organizations which prepare manpower forecasts is small. However, the available information although limited, has been analyzed. The results of this analysis are reported in this section.

6. Minnesota Department of Employment Security, Research and Planning Section, A Supplement to A Skill Survey - Minnesota's Minneapolis-St. Paul Area. St. Paul: 1966.

7. Minnesota Department of Employment Security, Research and Planning Section, Occupational Outlook: The Minneapolis-St. Paul Area, Including the Results of the Twin Cities Skill Survey. St. Paul: 1966.

In November 1963, the firms participating in the skill survey forecasted their total employment for November 1965. Actual and projected employment for November 1965 were compared. The median forecast error was 4.9 percent. The direction of the error, whether positive or negative, is disregarded because it is not relevant for this analysis. As indicated in the following table, of those with 4.9 percent error or greater, seven or 64 percent prepare forecasts of manpower requirements. Of those whose forecast error was less than 4.9 percent, four or 36 percent prepare forecasts. The implication of this data is that current forecasting efforts are inadequate. Apparently they do not enable one to accurately identify future employment levels. This interpretation will be discussed in greater detail below.

Table 4

Proportion Forecasting Manpower Requirements, by Forecast Error

Forecast Error	Forecast Manpower Requirements					
	Yes		No		Total	
	%	N	%	N	%	N
Hi (4.9% or over)	64	7	36	4	100	11
Low (under 4.9%)	36	4	64	7	100	11

One could reasonably anticipate that those organizations experiencing large changes in employment levels would be more likely to prepare forecasts of manpower requirements. The median percent change from November 1963 to November 1965 was 12.5. Again the direction of the change is not considered. Six of the 11, or 55 percent of those with employment changes of 12.5 percent or greater forecast manpower requirements. Although there is a tendency in the predicted direction, the difference is so small that little support is provided for the hypothesis that change in employment levels is positively related to preparation of manpower forecasts.

In the above discussion of forecast error and preparation of manpower forecasts it was stated that the evidence indicates that current techniques do not accurately predict future employment. Evidence to the contrary is found when one looks at only those 11 organizations experiencing high changes in employment. When only respondents experiencing employment changes of

Table 5

Proportion Forecasting Manpower Requirements Among Those with Large Changes in Employment, by Forecast Error

Forecast Error	Forecast Manpower Requirements					
	Yes		No		Total	
	%	N	%	N	%	N
Hi (over 9.9%)	25	1	75	4	100	5
Low (9.9% or less)	83	5	17	1	100	6

12.5 percent or greater are considered, one of five or 25 percent with high forecast error prepare manpower forecasts and five of six or 83 percent with low forecast error prepare manpower forecasts. Respondents which have experienced high changes in employment and which prepare manpower forecasts are better able to project their total employment. In determining whether current forecasting techniques can aid in projecting future employment, a significant intervening variable appears to be change in employment level. An explanation for this is that when an organization's manpower needs do not change over time one has only to look at current employment to predict future employment. It appears that only when employment levels change can manpower forecasting activities be demonstrated to be superior to a naive projection. The following table relates forecast error and preparation of manpower forecasts among respondents with total employment changes between November 1963 and November 1965 of less than 12.5 percent.

Table 6

Proportion Forecasting Manpower Requirements Among Those With Small Changes in Employment, by Forecast Error

Forecast Error	Forecast Manpower Requirements					
	Yes		No		Total	
	%	N	%	N	%	N
Hi (3.6% or over)	60	3	40	2	100	5
Low (under 3.6%)	33	2	66	4	100	6

Among respondents with high forecast error, three of five or 60 percent prepare forecasts of labor requirements. Among those with low forecast error, two of six or 33 percent prepare manpower projections. This data indicates that preparation of manpower projections is not positively related to forecast accuracy when there is little employment change. Apparently current approaches to manpower forecasting are such that shifts in employment of about 12 percent over a two year period are necessary to result in more accurate two year projections than those which result in the absence of manpower forecasting. Such a conclusion suggests that significant improvements in the accuracy of forecasting techniques are necessary if one is to engage in any realistic manpower planning.

E. Why Reporting Units Do Not Forecast Manpower Requirements

The limited responses to this question suggest two reasons for not forecasting manpower requirements.[8] Two of nine, or 11 percent state that the demand for their products is almost totally unpredictable even for periods as short as two or three weeks, thus making manpower forecasting impossible. The other seven respondents to this question report that their labor demands and labor supplies are stable. Consequently for these organizations there is little or nothing to be gained from manpower forecasting.

F. Line Managements' Attitudes Toward Manpower Forecasting

It was our opinion that the question of line management's attitudes toward forecasting could best be handled in an interview situation. This appeared to be one of the areas that respondents would be hesitant to address in a mail questionnaire. The interviewees were asked, what is line managements' attitude toward and evaluation of manpower forecasting?

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[8] Of the 19 returns reporting that manpower forecasts are not prepared, only nine responded to this question. This should be kept in mind in interpreting the significance of the findings.

All respondents indicated that the attitude was favorable and that the contribution and necessity of forecasting was recognized by line management. A few of those interviewed stated explicitly or implied that line managements' positive views of this activity are quite recent. For some, it was not too long ago that it was difficult to secure the aid and cooperation of managers in manpower forecasting activities. The attitude change is believed to have come about primarily as a result of the short supply of labor. Apparently, when it became difficult if not impossible to fill openings on short notice, managers began to see that there is merit in estimating future manpower needs and planning to meet those needs before they are immediate.

In considering the significance of the answers to this question, the source must be noted. The individuals interviewed in most cases are directly involved in forecasting. Since this is part of their job, there may be a tendency to overestimate other managers' views of the importance of forecasting.

If it is assumed that this tendency did not dominate the responses and that the information regarding managers' attitudes is essentially accurate, then there are two significant implications of these findings. First, the time is appropriate for securing the cooperation of line managers in manpower forecasting and planning research. A second implication involves the contribution of manpower forecasting and planning within an organization. The above replies suggest that in the absence of a tight labor market the benefits derived from forecasting and planning may not justify the costs. The position can be taken that manpower forecasting and planning is a worthwhile activity even in the absence of a tight labor market. In addition, it cannot be assumed that the tight labor market will continue indefinitely. Given the above it appears that research designed to identify the costs and benefits of forecasting and planning should be undertaken immediately if such activities are to be continued in the future. To build and/or maintain positive attitudes of managers toward these activities it will be necessary to demonstrate the conditions in which there is a positive payoff from manpower forecasting and planning.

VII. Workshop on Manpower Planning and Forecasting Systems

During the data gathering stage it became apparent that those reporting units participating in this investigation were very interested in manpower forecasting and planning, and wanted to learn more about this topic. Consequently, a workshop was held on November 9, 1967. The principle speakers were Frank Cassell from Inland Steel Corporation and Curtis Aller from the U.S. Department of Labor. In addition, four organizations presented their approaches to manpower forecasting, and the principle findings of this investigation were reported. Over forty representatives of private and public organizations attended. The proceedings of this workshop will be published shortly. The workshop and the publication of proceedings were financed by those attending.

VIII. Appendix

A. Methodology

1. Sample

The initial intention was to study the forecasting techniques of approximately twenty major firms which had participated in the Minneapolis-St. Paul Metropolitan Area Skill Survey conducted by the Minnesota Department of Employment Security in 1963.[1, 2] The sample was to be restricted to these firms because they had made two and five year projections of their manpower requirements, and the accuracy of these projections could be identified when the present study was conducted. This would permit the comparison of accurate and inaccurate forecasting techniques.

The sample was expanded beyond those included in the Skill Survey. This decision was based on two considerations. Some of the major employers in this metropolitan area had not participated in the Skill Survey and if they were not included in the current study, a significant source of information may have been overlooked. Second, shortly after the data gathering stage began it became apparent that if the sample were not expanded, there would not be twenty firms included which did prepare manpower forecasts.

The final sample consisted of almost all organizations in Minnesota which employed approximately 500 people or more. One hundred and five

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1. Minnesota Department of Employment Security, Research and Planning Section, A Supplement to a Skill Survey - Minnesota's Minneapolis-St. Paul Area. St. Paul: 1966.

2. Minnesota Department of Employment Security, Research and Planning Section, Occupational Outlook: The Minneapolis-St. Paul Area, Including the Results of the Twin Cities Skill Survey. St. Paul: 1966.

questionnaires were mailed, and of these, 69 useable responses were received. This is a response rate of 65 percent.

2. Data Gathering Techniques

Two methods of gathering data were employed, mail questionnaires and personal interviews. The former afforded an opportunity to get an overview of the respondents' forecasting techniques. If the questionnaire indicated that the particular organization had a sophisticated approach to forecasting or had some unique feature in their forecasting techniques, a personal interview was arranged. The interviews allowed the researchers to gain a better understanding of these unique or complex approaches. Of the 69 organizations completing the questionnaire, 50 prepared manpower forecasts and 25 of these were interviewed.

The development of the questionnaire went through several stages. We first attempted to design a questionnaire which structured the answers. We concluded that because little was known of the area of forecasting more information could be obtained by utilizing an open-end format. A questionnaire of this nature would allow those completing the questionnaire to explain and develop their answers and provide additional insight into techniques of forecasting.

A draft questionnaire was developed and a pilot study was conducted to determine the questionnaire's effectiveness. Members of the Industrial Relations Executive Council participated in the pilot study. The IREC is made up of the top industrial relations people in private industry in Minnesota. The principle function of this group is to discuss and exchange information and views about important industrial relations topics. Those completing the draft questionnaire were requested to comment critically on the subject area covered, meaningfulness of the questions and general format. Their comments and suggestions were used in developing the final form of the questionnaire. A copy of the final questionnaire is included in Appendix A.

It was our judgment, confirmed by the IREC members, that information of the nature we sought could not be gathered by questionnaires alone. A follow-up personal interview was conducted to help clarify and expand the information provided in the questionnaire. The questionnaire served as an overview of a unit's activities and provided a framework for the interviews. Additional questions which would be more appropriately raised within an interview setting were also discussed. Examples of such questions are, (1) top managements' attitudes regarding the value of manpower forecasting and (2) the accuracy of current forecasting techniques. A copy of the interview guide is included in Appendix A. The duration of the interviews ranged between two and five hours. The interviews were usually conducted with the individual responsible for manpower forecasting. If this was not the case, the interviewee was someone sufficiently familiar with manpower forecasting to answer our questions.

B. Data Gathering Instruments

1. Final Questionnaire

CONFIDENTIAL
MF 67-001

University of Minnesota
Industrial Relations Center

Manpower Planning and Forecasting

This questionnaire asks for information concerning the extent and nature of manpower forecasting in your firm. The questionnaire is part of a study being conducted to determine what manpower planning and forecasting activity is presently being done, how it is being done, and to what uses the results are applied. If the space provided for answering a question is not sufficient please use the extra space on the last page or attach an additional sheet to the questionnaire. The information you provide will be used only for research purposes, and information specific to your firm will be kept in strict confidence. Thank you for your cooperation.

Firm name______________________________

Division (if multi-division firm)______________________________

Your name and title______________________________

Date completed______________________________

We would like to have ______ additional copies of *Manpower Planning: A Research Bibliography.*

We would be interested in participating in the Manpower Planning and Forecasting Workshop to be held during the Fall of 1967. Yes____ No____

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1. What is your firm's, division's or multi-division's *(circle the appropriate unit)* total employment? ____________________

2. Do you prepare forecasts or projections of manpower requirements on a firm, division, and/or multi-division basis? (Check the appropriate units.)

	Yes	No
Firm	____	____
Division	____	____
Multi-division	____	____

If your answer to 2 is no, omit questions 3 thru 17 and proceed to question 18.

3. Are forecasts of manpower requirements made by: (check the appropriate line(s))

	Yes	No
Occupation (or job group)	____	____
Geographic area	____	____
Sex	____	____
Exempt/non exempt	____	____
Man-hours required	____	____
Other________________	____	____

4. Who *prepares* these forecasts and what is his *title?*

____

____

5. For whom are these forecasts prepared? (position titles)

____

____

6. For what period are these forecasts made? (Please note if a different period is used for different occupational groups.)

Time Period	**Occupational Group**
2 months ______	______
6 months ______	______
1 year ______	______
5 years ______	______
Other ______	______

Remarks:

7. How frequently are these forecasts made? (As in question 6, please note if frequency varies by occupational group.)

Time Period	**Occupational Group**
Monthly ______	______
Quarterly ______	______
Annually ______	______
Other ______	______

Remarks:

8. How long has your firm been preparing manpower forecasts?

Time Period	**Occupational Group**
6 months ______	______
1 year ______	______
5 years ______	______
10 years ______	______
Other ______	______

9. Are manpower forecasts related to forecasts of some other corporate activity? Yes______ No______

Which activities?______

10. Do you use forecasts made by other organizations (e.g., informal surveys, employer association surveys, Chamber of Commerce) in making your forecasts? Yes____ No____

Which ones?____

11. Are managers, foremen and other personnel surveyed to determine manpower needs? Yes____ No____

Which personnel?____________________________________

12. Are records containing the following information maintained by your firm and are regular reports or memos summarizing the data issued?

	Yes	**No**
Employees by occupational group	____	____
Data on separations and hires by occupational group	____	____
Current age by occupational group	____	____

Are these records maintained on a:

manual file system	____	____
computering file system	____	____

13. What basic information is used in the forecasting process? (e.g., gross sales, manning tables, skill inventories, etc.)

____

____

14. What factors do you believe to be most significant in determining future manpower requirements in your firm?

____

____

15. What additional information, if available, would be most helpful in improving the quality of the forecasts?

____

____

16. If forecasts are made for different occupational groups, which are the most difficult?

____

____

17. What actions do you take in the event of:

Over forecast____________________________________

____

Under forecast___________________________________

____

18. Are forecasts of manpower availability or supply made? Yes___ No___

19. Are these forecasts of supply made by: (please check the appropriate line)

	Yes	No
Occupational group	____	____
Geographic area	____	____
Sex	____	____
Other________	____	____

20. Are forecasts of other requirements prepared by your firm? (please check the appropriate line)

	Yes	No
Capital	____	____
Equipment	____	____
Raw material	____	____
Plant	____	____
Other________	____	____

21. Would you object to having a member of the Industrial Relations Center contact you to discuss this matter further. Yes____ No____

22. Please explain how and for what purposes the manpower forecasts are made within your firm. If your firm does not prepare forecasts, please explain if you plan to prepare them in the future and if not why not.

2. Interview Guide

- Ask them to generally describe the "flow" of the preparation of the forecast -- i.e., who is involved, source of inputs, etc. -- objective here is to get an overview to supplement the questionnaire.

- Clarification and follow up of questionnaire responses (the pre-work here involves going over the questionnaire with other members on the project and setting up questions aimed at getting more in-depth information on each question).

- The accountability for accuracy of the forecasts.

- Impact of technological change on manpower requirements (try to get examples).

- Attitude of line managers toward the manpower forecasting activity.

- Organizational set-up of planning group, reporting relationships, background and qualifications of personnel if possible, cost of setting up department and/or maintaining it.

- Ask for recruiting brochure and recent annual statement to obtain background data on company. Also general description of this location's relationship to rest of the organization. Ratio of indirect (support) to direct (production) employees if available.

C. Statistical Appendix

Table A1

Proportion of Reporting Units
Forecasting Manpower Requirements

Forecast Requirements	Industry					
	All		Mfg.		Non-Mfg.	
	N	%	N	%	N	%
Yes	50	72	29	67	21	81
No	19	28	14	33	5	19
Total	69	100	43	100	26	100

Table A2

Proportion of Reporting Units Forecasting Manpower Requirements (by Industry)

Industry	Forecast Requirements					
	Yes		No		Total	
	N	%	N	%	N	%
Equipment	10	91	1	9	11	100
Food	6	75	2	25	8	100
Machinery	9	64	5	36	14	100
P.C. and R.*	3	60	2	40	5	100
Wood	1	20	4	80	5	100
T.C. and P.U.**	5	83	1	17	6	100
Trade	8	80	2	20	10	100
F. and I.***	8	80	2	20	10	100

*Petroleum, Chemical and Rubber
**Transportation, Communication and Public Utilities
***Finance and Insurance

Table A3

Proportion of Reporting Units Forecasting Manpower Requirements (by Size)

Forecast Requirements	Number of Employees							
	Less than 999		1000-1999		2000-4999		5000 or more	
	N	%	N	%	N	%	N	%
Yes	11	50	11	73	13	87	15	88
No	11	50	4	27	2	13	2	12
Total	22	100	15	100	15	100	17	100

Table A4

Proportion of Reporting Units Forecasting Manpower Supply (by Industry)

Forecast Supply	Industry					
	All		Mfg.		Non-Mfg.	
	N	%	N	%	N	%
Yes	25	36	14	33	11	42
No	44	64	29	67	15	58
Total	69	100	43	100	26	100

Table A5

Proportion of Reporting Units Forecasting Manpower Supply (by Size)

Forecast Supply	Number of Employees							
	999 or less		1000-1999		2000-4999		5000 or more	
	N	%	N	%	N	%	N	%
Yes	5	23	7	47	6	40	6	35
No	17	77	8	53	9	60	11	65
Total	22	100	15	100	15	100	17	100

Table A6

Responsibility for Preparing
Forecasts of Manpower Requirements

Prepared by the Personnel Dept.	N	%
Yes	22	44
No	28	56
Total	50	100

Table A7

Proportion of Forecasts of Manpower Requirements Prepared by Personnel (by Industry)

Prepared by the Personnel Dept.	Industry			
	Mfg.		Non-Mfg.	
	N	%	N	%
Yes	11	38	11	52
No	18	62	10	48
Total	29	100	21	100

Table A8

Proportion of Forecasts of Manpower
Requirements Prepared by Personnel
(by Size)

Prepared by the Personnel Dept.	Number of Employees					
	999 or less		1000-4999		5000 or more	
	N	%	N	%	N	%
Yes	7	58	9	41	6	38
No	5	42	13	59	10	62
Total	12	100	22	100	16	100

Table A9

For Whom Are The Forecasts Prepared? (by Industry)

Industry	Prepared For Which Dept.?			
	Personnel		Non-Personnel	
	N	%	N	%
Mfg.	7	24	22	76
Non-Mfg.	5	24	16	76
Total	12	24	38	76

Table A10

For Whom Are The Forecasts Prepared?
(by Size)

Number of Employees	Prepared For Which Dept.?			
	Personnel		Non-Personnel	
	N	%	N	%
Less than 1000	1	8	11	92
1000 - 1999	3	33	6	67
2000 - 4999	2	15	11	85
5000 or more	6	38	10	62
Total	12	24	38	76

Table A11

Experience in Forecasting Manpower Requirements

Number of Years Forecasts Have Been Prepared	N	%
1 year or less	9	18
2 - 4 years	7	14
5 years	13	27
10 or more years	20	41
Total	49	100

Table A12

Period Covered by the Longest
Forecast of Manpower Requirements

Length of Forecast	N	%
1 year or less	22	44
2 - 4 years	6	12
5 years or more	22	44
Total	50	100

Table A13

Factors Used to Predict Manpower Requirements

Factor	Yes		No		Total	
	N	%	N	%	N	%
Sales	22	62	18	38	47	100
Labor Supply	21	45	26	55	47	100
Work Load	16	34	31	66	47	100
Facilities Expansion	16	36	31	66	47	100
Turnover	9	19	38	81	47	100
Technical & Administrative Change	8	17	39	83	47	100
New Products	8	17	39	83	47	100
Company Objectives	7	15	39	83	47	100
Budget	5	11	42	89	47	100

Table A14

Factors Used to Predict Manpower Requirements (by Industry)

Factor	Industry							
	Mfg.				Non-Mfg.			
	Yes		No		Yes		No	
	N	%	N	%	N	%	N	%
Sales	19	70	8	30	10	50	10	50
Labor Supply	11	41	16	59	10	50	10	50
Work Load	9	33	18	67	7	35	13	65
Facilities Expansion	7	26	20	74	9	45	11	55
Turnover	4	15	23	85	5	25	15	75
Technical & Administrative Change	3	11	24	89	5	25	15	75
New Products	8	30	19	70	0	0	20	100
Company Objectives	2	7	25	93	5	25	15	75
Budget	3	11	24	89	2	10	18	90

Table A15

Occupational Groups for Which Manpower Forecasts are Prepared

Occupational Groups	Yes		No	
	N	%	N	%
All Occupations	17	34	33	66
Exempt Occupations	2	4	48	96
Non-Exempt Occupations	1	2	49	98
Mgr. and Admin.	11	22	39	78
Tech. and Prof.	4	8	46	92
Production	4	8	46	92
Sales	3	6	47	94
Clerical	1	2	49	98
No Response	6	12	44	88

Table A16

Uses of Manpower Requirement Forecasts

Uses	Yes		No		Total	
	N	%	N	%	N	%
Recruiting	43	91	4	9	47	100
Budget & Financial Plans	17	36	30	64	47	100
Training	17	36	30	64	47	100
Transfer and Promotions	14	30	33	70	47	100
Space & Facilities Plan	5	11	42	89	47	100
Production Plan	5	11	42	89	47	100
Acquisition & Expansion Plans	2	4	45	96	47	100
Product Pricing	1	2	46	98	47	100
Force Managers to Plan	1	2	46	98	47	100

Table A17

Utilization of Manpower Requirement Forecasts by Length of Forecast Period

Forecast Period	Recruiting		Budget & Financial Plans		Training		Transfer and Promotion	
	N	%	N	%	N	%	N	%
1 year or less	19	95	4	20	5	25	5	25
2 - 4 years	6	100	2	33	1	17	-	-
5 years or more	18	86	11	52	11	52	9	43

Table A18

Other Forecasts Prepared by the Reporting Units Making Forecasts of Manpower Requirements

	Other Forecasts							
	Capital		Equipment		Raw Materials		Plant	
	N	%	N	%	N	%	N	%
Yes	45	90	46	92	31	62	39	78
No	5	10	4	8	19	38	11	22
Total	50	100	50	100	50	100	50	100

Table A19

Actions Taken in the Event of an Error in Forecasting Manpower Requirements by Type of Error

	Type of Error							
	Underestimate				Overestimate			
	Type of Action				Type of Action			
	Adjust Work Load		Adjust Manpower		Adjust Work Load		Adjust Manpower	
	N	%	N	%	N	%	N	%
Yes	2	12	15	88	3	16	16	84
No	15	88	2	12	16	84	3	16
Total	17	100	17	100	19	100	19	100

Table A20

Manpower Adjustments When
Requirements are Underestimated

	Type of Adjustment									
	Accelerate Hiring		Overtime		Recall		Transfer		Training	
	N	%	N	%	N	%	N	%	N	%
Yes	14	82	3	18	3	18	1	6	1	6
No	3	18	14	82	14	82	16	94	16	94
Total	17	100	17	100	17	100	17	100	17	100

Table A21

Manpower Adjustments When Requirements are Overestimated

	Type of Adjustment									
	Slow or Stop Hiring		Transfer		Stop Overtime		Attrition		Layoff	
	N	%	N	%	N	%	N	%	N	%
Yes	8	42	5	5	5	5	4	21	7	37
No	11	58	14	95	14	95	15	79	12	63
Total	19	100	19	100	19	100	19	100	19	100

Table A22

Most Difficult Occupational Group to Forecast (by Industry)

Industry	Occupational Group													
	Professional & Technical		Management		Sales		Clerical		Blue Collar & Production		No Difference		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Manufacturing	6	33	7	39	2	11	1	6	4	22	1	5	18	100
Non-Manufacturing	-	-	7	54	1	8	3	23	1	8	1	8	13	100

Table A23

Additional Information Which Would Be Helpful For Accurate Manpower Forecasting

Type of Information	Yes		No		Total	
	N	%	N	%	N	%
Company Plans & Objectives	7	26	20	74	27	100
Sales & Production Forecast	6	22	21	78	27	100
Internal Labor Supply	6	22	21	78	27	100
Technical & Administrative Change	5	18	22	82	27	100
External Labor Supply	5	18	22	82	27	100
Misc. Org. Requirements	4	15	23	85	27	100

Table A24

Use of Forecasts Made by Other Organizations in Making Manpower Forecasts (by Industry)

Use Other Organizations Forecasts	Industry					
	Mfg.		Non-Mfg.		All	
	N	%	N	%	N	%
Yes	6	21	4	19	10	20
No	23	79	17	81	40	80
Total	29	100	21	100	50	100

Table A25

Use of Forecasts Made by Other Organizations in Making Manpower Forecasts (by Size)

Use Other Organizations Forecasts	Number of Employees									
	999 or less		1000-1999		2000-4999		5000 or more		All	
	N	%	N	%	N	%	N	%	N	%
Yes	2	17	3	33	2	15	3	19	10	20
No	10	83	6	67	11	85	13	81	40	80
Total	12	100	9	100	13	100	16	100	50	100

Table A26

Managers, Foremen and Other Personnel Surveyed in Determining Manpower Needs (by Industry)

Survey	Industry					
	Mfg.		Non-Mfg.		Total	
	N	%	N	%	N	%
Yes	27	93	19	90	46	92
No	2	7	2	10	4	8
Total	29	100	21	100	50	100

Table A27

Managers, Foremen and Other Personnel Surveyed
in Determining Manpower Needs
(by Size)

Survey	Number of Employees											
	Less than 500		500-999		1000-1999		2000-4999		5000 or more		All	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	3	100	8	89	8	89	12	92	15	94	46	92
No	-	-	1	11	1	11	1	8	1	6	4	8
Total	3	100	9	100	9	100	13	100	16	100	50	100

Table A28

Additional Records Kept by Industry

Industry	Type of Records											
	Employees by Occupational Group				Separations & Hires by Occup. Group				Current Age by Occup. Group			
	Yes		No		Yes		No		Yes		No	
	N	%	N	%	N	%	N	%	N	%	N	%
Mfg.	23	79	6	21	20	69	9	31	11	38	18	62
Non-Mfg.	19	90	2	10	18	86	3	14	11	52	10	48
Total	42	84	8	16	38	76	12	24	22	44	28	56

3

D. Case Histories

This section contains case histories of the more advanced or unique techniques of forecasting manpower requirements or manpower supply. When appropriate the case histories were organized in accordance with the following outline.

Outline of Case Histories

1. Description of Reporting Unit
2. Interesting Features of this Organization's Forecasting Techniques
3. Description of Techniques
    a. Nature of the Forecast
    b. Responsibility for Manpower Forecasting
    c. Predictors of Requirements
    d. Sources of Information about the Predictors
    e. Techniques of Deriving Manpower Forecasts
    f. Who Receives the Forecasts?
    g. Uses of Forecasts

Case 1

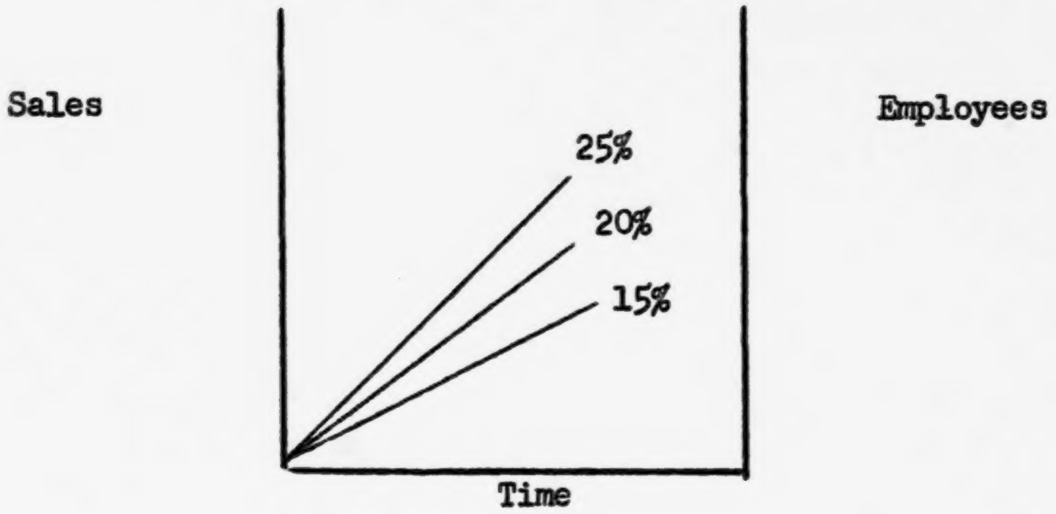
The manpower forecasting techniques of a corporation whose principle products are instruments for industry are described in this case. About 700 people were employed by this corporation in 1967. In 1966 its assets exceeded 3.5 million and its sales were approximately 10 million. Sales have increased four times since 1960. Twenty percent of those employed by this organization have technical degrees.

There are a number of interesting features in this organization's forecasting techniques. They are: forecasting for a range of manpower needs; the approach to forecasting for transfers and for R and D personnel; and the effect of technological change on manpower requirements.

Manpower forecasts were first prepared one year ago. Two manpower forecasts are prepared annually. One forecast is for total employment, and it estimates needs for each of the next five years. This forecast is prepared by top management and related sales and employment. Top management refers to the vice presidents and the division managers. The forecast is presented in the following form. The left axis represents sales, the right axis indicates number of employees, and the bottom axis expresses time.

A1

Projecting A Range of Manpower Requirements



In addition to forecasting the most probable increase in sales and employment, estimates are made of reasonable maximum and minimum rates of growth. For example, the 25 percent increase per year represents a reasonable maximum. The 15 percent increase per year represents a reasonable minimum. The 20 percent increase would be considered the most probable rate of growth. Sales is the crucial factor in projecting employment. Consequently, if sales increase at the rate of 20 percent each year, it is anticipated that employment will increase at the same rate.

The forecast by top management is used as a basis for financial and building planning, and to some extent in recruitment planning. The reason for not basing recruiting plans entirely on this forecast is that better short range information for recruitment purposes is forthcoming from the other manpower forecast which will be described below. The five year forecast provides only a rough guide for planning and can be quite inaccurate. The inaccuracy stems from the philosophy of top management. Their goal is to seek out those product areas where this organization can be the industry leader. To do this a great deal of emphasis is placed on R and D. Consequently, technological change has a significant impact on the composition and level of manpower requirements. Because this organization seeks to be a leader in its product fields, it cannot look to what the leaders are doing to see what impact changes will have.

The second manpower forecast, also prepared annually, estimates manpower requirements by department. The forecasts are for needs in six employee categories. These are: engineers, other exempt employees, assemblers, technicians, clerical and other non-exempt employees. The forecast period is one year.

The forecasts by department are prepared by the department managers and are based on sales forecasts. The manpower forecast is forwarded to the secretary-treasurer and to the personnel manager. A unique aspect of this manpower forecast is that the department manager indicates the number required in addition to those on board or, if appropriate, the excess number on board. Example A1 is a copy of the form used for this report. The departmental forecast indicates the number, by employee type and for exempt employees by background when additional personnel are needed or when people on board will be available for transfer. Because this information was reported the personnel department can coordinate transfers between departments which are expanding and those which are overstaffed. The departmental manpower forecasts are used for planning the personnel department's recruiting efforts and by the treasurer for financial planning.

A special feature of manpower forecasting in this organization is its approach to projections for R & D personnel. In departments other than R & D, manpower projections are a function of sales. In R & D requirements are based on sales and on probable payoff of the particular research project. Each project is rated from 1.0 (can't miss) to 0.0 (no possible payoff). Employment outside R & D will always be positively related to sales. However, depending on the project ratings, it is possible that employment in R & D would be inversely related to sales.

Example A1

Manpower Forecasting Form

To:

From:

Subject: Fiscal '68 Manpower Needs

As part of your 1968 budget, you have been asked to forecast your manpower needs. For more effective use of this information, would you break down your '68 requirements below. We need to know when employees may be available for transfer as well as your additional needs. In transfer situations, we do not want employee names, just circle the estimated annual cost and number of people to indicate transfer. This does not replace the personnel requisition.

EXEMPT

No. of People	Degree	Year's Experience	Est. Date Needed or Avlb. for Transfer	Est. Annual
Engineers:				
Others:				

NON-EXEMPT

No. of People	Est. Date Needed or Available for Transfer	Est. Annual Cost
Assemblers:		
Technicians:		
Clerical:		
Other:		

Case 2

The manpower forecasting techniques described in this case refer to a public utility which provides services in parts of four states. In 1966 it had 900,000 customers and its revenues were approximately 245 million dollars. Over 6,300 persons are employed by this company.

The approach to manpower forecasting in this organization is similar to that used in most companies participating in this exploratory study. There is one aspect of forecasting activities in this company that is not used by any of our other respondents. Comparisons are made with industry manpower utilization data, and these serve as a check on the realism or accuracy of the manpower projections.

This company has forecasted its manpower requirements for the past ten years. Projections are made of needs for all employees. The employee categories forecasted are blue collar, white collar, engineers and total college graduates. Forecasts for the first three categories cover a one year period, and the latter is for five years. Projections for blue collar and white collar employees are prepared monthly. The forecasts for engineers and total college graduates are prepared annually. A possible explanation for this employee breakdown for forecasting is its history of innovations which have an impact on manpower requirements. This company has experienced a slight decline in employment in the past ten years. In December 1956 it had 6,800 employees, and in July 1967 it had 6,300 employees. During this same period the increase in production has averaged seven per cent annually. Although total employment has been fairly stable the composition of the labor force has changed. There has been a reduction in the proportion of blue collar workers and an increase in the proportion of white collar workers.

The manpower forecasting activities in this firm are the responsibility of each department's vice president. Each section manager prepares the manpower forecasts for his section. These are presented to the department vice president who in turn presents them to the Board of Directors.

Each department prepares an annual forecast for one year of the number of employees by occupation (job), sex, and exempt and non-exempt employees. The forecasts are based primarily on projections of production. They also consider such factors as weather and retirements. In addition to the number of employees needed in each job, the salaries of these employees are also projected. The manpower forecast then becomes a manpower budget against which the department has to perform.

One unique feature of this industry is a trade association which collects and exchanges information about manpower utilization. This company uses this information as a yardstick against which they judge the effectiveness and realism of the departments' projections. The Board and President will compare the number of employees and salaries by function with similar utility companies. There have been several instances in which the President of the company required the budgets to be raised or lowered, based on these comparisons.

The only long range forecasts prepared are those for total college graduates. This is a five year forecast and is based on a "decreasing ratio of graduates to total production". This firm's rate of growth is "almost constant" and consequently, the forecasts are "pretty accurate". These forecasts provide a basis for the recruiting plans of the personnel department.

Case 3

This case study is of a bank. In 1967 approximately 650 people were employed by this organization, and its assets were valued in excess of 550 million dollars. The majority of the labor force is made up of clerical workers and the remainder is composed primarily of managerial employees.

The unique aspect of this organization's forecasting techniques is its use of manning tables and skills inventories.

Manpower forecasting has been done by this bank for ten years. Forecasts are prepared semi-annually for each of three employee groups. These groups are: top management of the bank, middle management employees and clerical employees. The length of the forecast periods for these groups are respectively: each year for ten years, each year for five years and one year.

The manpower forecasts are prepared by the vice president in charge of personnel. The factors considered to estimate future manpower requirements are anticipated new services, systems changes, growth, retirements and other separations. An example of a systems change is the introduction of a computer to perform work formerly done by clerical employees. Information pertaining to these factors is forwarded to the personnel department by the department heads, the division managers and the bank president.

Based on the above information, estimates of the number required in each of the three employee groups at the various points in time are made. A manning table is prepared for the top management group. This indicates the number of present, additional and total officers, by position, required by each division. In addition, the point in time and reason for each addition is indicated. The form at the end of this case exemplifies the use of manning tables by this organization.

Reports of the forecasts are submitted to the bank president, division heads, auditor and training director. The forecasts are used for budgetary considerations and for manpower planning. It was reported that since the labor market has tightened considerably in this geographical area, top management's attitude toward the importance of manpower forecasting has improved a great deal. It is no longer difficult to secure managers' cooperation in forecasting for manpower.

A special feature of this case is that two skills inventories are maintained to assist in manpower planning. One inventory indicates the name, education and job experience of about 80 employees who are members of middle management and are expected to progress to the top management level. The information about each of these employees is regularly updated. This skills inventory coupled with the manning table enables the personnel department to identify possible trouble spots. For example, are there personnel on board that will be qualified to fill the top management vacancies expected to arise in 1970?

The second skills inventory is for clerical employees. Unlike the above inventory, the clerical employee inventory is not updated. When one is first employed, one's typing and shorthand speed, foreign language skills, and results of the personality, vocabulary, numerical and reasoning tests are placed on a card. Information has been gathered indicating requirements on these dimensions by job so that when vacancies occur the personnel department can use the skills inventory to identify those employees capable of filling the various vacancies.

Example A2 -- Manning Table Form

Estimate Officer Requirements for Period Jan. 1966 through Dec. 1975

Function	Present No. of Officers	Position	Present Incumbent	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Reason	Anticipated Total 1975
	1														1
		Sr. V. P.		X										Retirement	
		Jr. Officer					X							Growth	
	8	Jr. Officer										X		Growth	10
		Vice Pres.		X										Retirement	
		Vice Pres.					X							Retirement	
		Vice Pres.											X	Retirement	
		Jr. Officer				X								Growth	
	6	Jr. Officer										X		Growth	8
	4	Jr. Officer			X									Growth	5
	1														1
	4														4
		Asst. Cashier			X									Retirement	
		Asst. V. P.										X		Retirement	
	2	Jr. Officer		X					X					Growth	4
	2	Jr. Officer							X					Growth	3
		Jr. Officer			X									Growth	
	1	Asst. V. P.									X			Retirement	2
	1	Jr. Officer		X										Growth	2
		Sr. V. P.											X	Retirement	
	5	Jr. Officer					X							Growth	6
	2														2
	8	Vice Pres.						X						Retirement	8
		Jr. Officer		X		X								Growth	
		Asst. V. P.							X					Retirement	
		Asst. V. P.							X					Retirement	
	7	Asst. Cashier									X			Retirement	9
	3														3
	1	Jr. Officer				X								Growth	2
	56														70
Total Requirements				5	3	3	3	1	4	0	2	3	2		

26 Total Requirements - 12 Retirements & 14 due to Anticipated Growth - Expansion

Case 4

The corporate manpower forecasting activities of a discount store chain are described in this case. In 1966 its sales exceeded 60 million dollars, it had seven locations and employment was about 2,000. The major occupational group is sales personnel.

The unique aspect of this case is the emphasis on relating manpower forecasting to corporate planning and the anticipated rate of expansion. Managerial employment in 1967 was 300 and by 1969 it is expected to be 600.

Manpower forecasts have been prepared for the past five years. Managerial needs are projected for the next three, five and ten years. In the three year forecasts, the number of regular non-exempt and part time employees, in addition to managerial requirements, are estimated by location. Each of these forecasts are prepared annually.

The corporate Personnel Director prepares the manpower forecasts. The factors used to predict manpower requirements are sales and new locations. The latter stems from the corporate plan. It is felt by the Personnel Director that it is essential to have complete knowledge of the corporate plans in order to prepare adequate manpower forecasts. Three, five and ten year corporate plans are prepared by the operating committee. This committee is composed of the President, the heads of the merchandising, personnel and finance departments, and the three regional directors. The operating committee and the division heads provide the sales forecasts.

In addition to the above forecasts, a one year forecast is prepared for the positions of store manager, assistant store managers, and receiving manager. This forecast identifies each individual that will be filling these positions as they become available during the coming year.

The five and ten year forecasts serve as a rough guide for managerial development and recruitment. The three year forecast for managers is more of a plan of what will happen, barring adverse economic conditions. In the latter forecast managerial categories have been identified. Attention is focused on having an adequate number of trainees and promotable lower level personnel on board to meet the forecasted requirements. This number is adjusted for quits and discharges. By having an adequate number of personnel in the entry positions, management is free to promote and transfer managers as economic conditions suggest.

These forecasts are submitted to the operating committee. They are used for budgeting, planning training and recruitment. It is felt that these forecasts also serve as a useful communications function. The forecasts are made available to all store managers; consequently, the managers know why it is necessary to have so many managerial trainees on board. As mentioned above, the number of managerial personnel will increase from 200 at present to 600 in 1969.

Case 5

The subject of this case is a major life insurance company. For 1966 its income was 104 million dollars, its assets 462 million dollars and there were approximately 545 employees. The labor force is made up largely of clerical workers.

This company is included in our case studies because it is another example of the fairly sophisticated approach of some organizations to projecting requirements for indirect workers.

Two types of manpower forecasting are prepared. The first is manpower budgeting forecasting and has been done for two years. Two employee groups, clerical and exempt or support, are forecasted. The forecasts are prepared annually and cover a one year period.

The department managers are primarily responsible for the forecasting efforts, with the Director of Training acting as the controller and coordinator of forecasting. The clerical forecasts are based on "work measurement standards, work volume trends and expansion plans." Work measurement standards are the key tasks or activities performed by a section, i.e., the number of lines typed or the number of policies handled. A work measurement team studies the work within each department to determine what are the key tasks or activities. The team uses a work sampling method. Each key task or activity is assigned a weight based on the average man-hours necessary to complete the task, or some unit of the task, e.g., 100 lines types. The work measurement standards are prepared for each section. The section supervisor and department manager estimate the volume of measured work that will occur during the coming year. This estimation is based primarily on past experience, and on any known deviation during the next year. Examples of deviations are a major new policy holder, or converting part of the operation to EDP.

The projected measured work volume is multiplied by the standard work measure, giving an estimate of man-hours required. The man-hours required is converted to costs (salaries) by each department based on the present employees' projected salaries and any new positions and/or new employees that may be required to handle the measured work volume.

Each department manager reports his "man-hours budget" to the Training Director who acts as a control. The Training Director approves or does not approve the budget. The decision to approve or disapprove the man-hours budget is based on the cost per man-hour worked. The budgets are then passed along from the Training Director, the Personnel Manager and finally to the Board of Directors.

The forecasts really are budgets against which the departments work. If additional manpower is necessary, the department can justify their requests on the basis of the projected work volume. The departments ask the personnel department to add employees to existing positions or to write a new position description for the position.

The forecasts for manpower requirements for exempt or support personnel are based on a ratio of support to line personnel. Currently a ratio of about 1/10 is maintained for supervisory support personnel and similar ratios have been developed for measuring technical, middle management, and top management support. The second type of forecasting is of long range manpower requirements. These are developed on the basis of trends of required work necessary to be accomplished. Growth rates are determined by line of business and used to make manpower projections. In addition, consideration is given to such things as EDP economies, new product lines, etc. These projections are made for periods up to 15 years and are updated annually on the basis of current data.

As indicated above, the manpower forecasts are used for recruiting and selection and for controlling labor costs. Another purpose of these forecasts in this company is planning space and facilities.

Case 6

This case refers to a retail catalog house which employs 1,500 people and services a seven state region. The parent company is one of the largest retailing and catalog businesses in the world. The labor force of the catalog house is composed mainly of clerical employees and materials-handling workers.

The manpower forecasting techniques of this organization were included in our case studies for two reasons. First, this organization experiences wide fluctuations in employment annually. Second, this organization has specified the alternatives to be used to meet forecasted requirements.

Manpower forecasts have been prepared at this location for 30 years. The requirements for two groups of employees, merchandise handlers and management trainees, are forecasted. Both forecasts are made once a year, during the month of August. The projection for management trainees covers the upcoming two years and the projection for materials handlers covers the upcoming four months.

The major manpower forecasting activities in this organization relate to the upcoming volume periods (Christmas and back-to-school) and to taking inventory. The work force doubles (to 3,000) during the fall volume period. The organization "dies" in mid-December and then hires a different variety of skills for the post-Christmas returns and reconditioning.

Manpower forecasting is an integral part of the over-all budgeting cycle. The manpower estimates are based upon gross sales forecasts. Sales estimates are based upon ten-year patterns and trends, catalog items, planned discount promotions, and the weather. Regarding the latter factor, it seems that a major set of catalog customers are farmers of Scandinavian decent, and they apparently find buying on credit is aversive, preferring to purchase with cash. Good crops will lead to good business and vice versa. When employees are traveling to outlaying stores, they often stop to look at the crops. Farm Bureau reports are an important element in sales forecasts. Gross sales forecasts and order volume estimates are provided for the first-line supervisors.

First-line supervisors maintain detailed data on dollar budgets, sales, and volume of orders handled. Scheduling Supervisors (one per catalog house floor) review these data for the past five year period and then submit their budget and manpower forecasts of materials handlers for hierarchical review and consolidation. The manpower forecasts are made separately for about 50 job titles. Final review of manpower estimates is made by the Catalog House's General Manager and Personnel Manager, but the dollar budget is ultimately submitted to corporate headquarters for approval.

Accountability for the accuracy of estimates rests with the supervisors. A computerized report informs supervisors daily of hours worked, average daily wage rate, actual versus budgeted payroll plus variance in both dollars and percentage, and the supervisor's current Performance Index (based upon 1.00 as being on target).

Manpower forecasting for management employees provides the foundation for a five-year management development plan. Forecasting for management trainees is based upon a two year period. This forecasting is based upon such variables as age, promotions, performance, retirements and career paths.

If an underforecast of wage employees occurs, the following actions are taken to expand employment: advertising, hire part-time help, recall former employees, authorize overtime, conduct special short-course training and utilize job dilution. An example of dilution is the breaking down of an Order Filler Checker job into separate positions where one woman fills orders, a second checks these orders, while a third wraps them. Technology (e.g., heavy lifting) prohibits the temporary substitution of women into many of the handlers jobs. The organization is adamant in refusing to hiring standards due to analyses of the effects of past experiences. Rather than lower hiring standards, the following actions are taken: special recruiting in high schools, cash rewards to present employees for the hiring of friends, and recruitment literature inserted in credit mailings.

When the Personnel Manager was asked about the accuracy of the manpower forecasts, he responded that they are as accurate as the sales forecasts. This statement is especially significant. This organization has detailed data to derive relationships of manpower requirements from work load measures, but demand for labor is derived from a product demand which fluctuates due to uncertain dements such as consumer preferences and the weather.

Case 7

The manpower forecasting techniques of a corporation in the food industry are described in this case study. It operates more than 20 major plants and employs approximately 12,500 people. Net sales exceeded 525 million dollars and assets exceeded 135 million dollars in 1967.

This case is an example of a decentralized approach to manpower forecasting. Projections for all employee groups are made, but the forecasts for particular groups are made at different levels within the corporation. This approach could be advantageous in that those individuals who are more closely associated and familiar with a particular employee group would be more aware of the factors affecting requirements for the particular employee group. A special feature of this case is the description of the influence of technological change of employment on the level and the structure of the labor force.

For the past five years manpower forecasting has been conducted in this company. The forecasting activities focus upon requirements for the coming year and are prepared quarterly. Forecasting requirements for hourly employees is done at the plant level. Product demand follows a cyclical pattern for this organization. Once product demand is estimated, production worker requirements are readily derived.

The second round of manpower forecasting is at the division level. It is at this level that forecasts of requirements for supervisory and professional personnel are prepared. Because the divisions are organized primarily on a functional basis forecasts are by occupational category. The manpower forecasts are prepared by each division's Personnel Manager and Controller. The basis for the forecasts at this level are the business plans for the coming year. The recipients of these forecasts are the division's General Manager and Employment Manager. The major decisions based upon these forecasts relate to college recruiting and training programs.

The Corporate Personnel unit prepares the manpower forecasts for top-management which is defined as those at or above the second level of division management. Here forecasting takes the form of planning for promotions and retirements. Top management is said to be concerned about succession in top management. This explains the focus of manpower forecasting at this level. Corporate forecasting efforts are directed by the Compensation and Organization Planning Manager who reports to the Vice President of Personnel and Organization Planning.

An interesting aspect of this case is the impact of technological change on the company's manpower requirements. Although total employment has remained relatively constant for some years, there have been marked changes in the skill mix of the labor force. It was stated that the Leavitt-Whisly prediction is not being borne out in this company; that in fact a growth in the middle management ranks has been experienced. Particular growth has occured in employment of professional personnel in the marketing and control areas. The major technological change contributing to the growth of middle management has been the computer. With the use of computers comes the need for professionals in such fields as information systems and management science. At the plant level technological change has been evolutionary in character. For example, a cake mix line of today still resembles the line of ten years ago, but much of the machinery along the line are improved versions. Changes in manpower requirements resulting from such innovations have been through attrition and retraining.

Case 8

This case describes the manpower forecasting techniques of one manufacturing company. This operation had about 3000 employees in 1967. The labor force is composed mainly of skilled production workers.

This case is included because the manpower forecasts are used in a wide range of ways such as product pricing, production scheduling and manpower planning, and because the importance of considering learning time is indicated.

Forecasts have been prepared for the past ten years. Each quarter the average weekly production manhour requirements in three job categories are forecasted for the coming five years. The three job categories are welding, machining and assembly.

The Manufacturing Systems Manager is responsible for the manpower forecasts. The projection is based primarily on fixed contracts. Fixed contracts are a certainty. In addition, some allowance is made for probable contracts. There are three classifications of probable contracts: almost certain, fairly certain, and a chance of getting the contract. Contract information is obtained from sales and engineering personnel. Data indicating production manhours required by product is obtained either from the accounting department or the industrial engineering department. If the particular product has been manufactured previously, the accounting department has the necessary basic information. If the product is to be produced for the first time, the industrial engineering department estimates the manhours required.

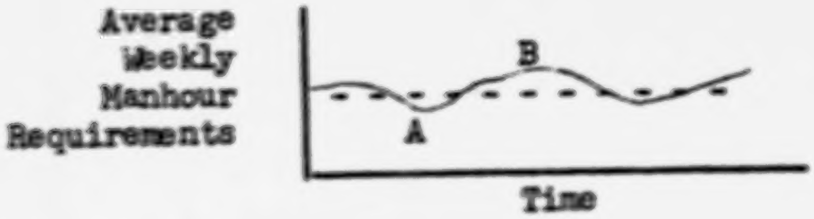
The above information indicates manhours required by product. The information is then summed to obtain an estimate of total manhours required over a specified period of time.

The forecasting process involves four areas: product pricing, production planning, manpower planning, and budgeting. Since labor is a major input, an accurate estimate of labor requirements is necessary to arrive at the price of the product. The following incident indicates the importance of accurate forecasts for product pricing and the necessity of considering learning time in forecasting manhours. A contract was made some time ago to deliver a number of widgets.[1] Three years prior to this contract an order of identical widgets had been delivered. Estimates of the manhours required for the more recent order assumed that the production workers would reach standard faster than in the previous case because this would be the second time these widgets were to be produced.

The forecast also acts as a device to see if production is on schedule. If actual manhours are greater or fewer than projected manhours, production is either ahead of or behind schedule. The forecasts also indicate the desirability of juggling the production schedule and of subcontracting. In the diagram below the dashed line represents a fairly constant level of employment.

Diagram A2

Manpower Supply and Demand



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[1] "Widgets" is a term used to avoid identifying the nature of this organization's product which, if known, would identify the organization.

The solid line represents manhours required as indicated by contract delivery schedules. This organization attempts to level off the manhours required by shifting delivery schedules, by taking on contracts and by subcontracting. For example, the production valley at A may be filled by producing B ahead of schedule or by attempting to obtain additional contracts. If B cannot be produced ahead of schedule, the contract will be met through overtime and through subcontracting.

Hiring and layoffs are guided by the manpower forecasts. Only when there is projected long term change in manhour requirements will the work force be expanded or cut back. The tight labor market makes it almost impossible to hire skilled personnel, and the costs of training unskilled workers prohibit short term employment expansions. The tight labor market also leads to a high termination rate of those laid off; consequently, short term employment cut-backs are unprofitable.

The manpower forecasts are also used in another phase of manpower planning. As indicated above, the forecasts of manhours are broken out into three job groupings: welding, machining, and assembly. Since some individuals in one job group are capable of performing jobs in another group, short term transfers are made from one group to another as production schedules dictate.

Case 9

The manpower forecasting activities outlined in this case refer to one location of a large retail corporation. In 1966 the corporation's employment was 105,000, gross sales were 2.5 billion and net income was 79 million. Employment at the location on which this case is based was 625. The main component of this location's labor force is female sales personnel.

The more interesting aspects of this case are the considerations of promotion routes and rates of managers and the use of transfers to adjust to manpower imbalances.

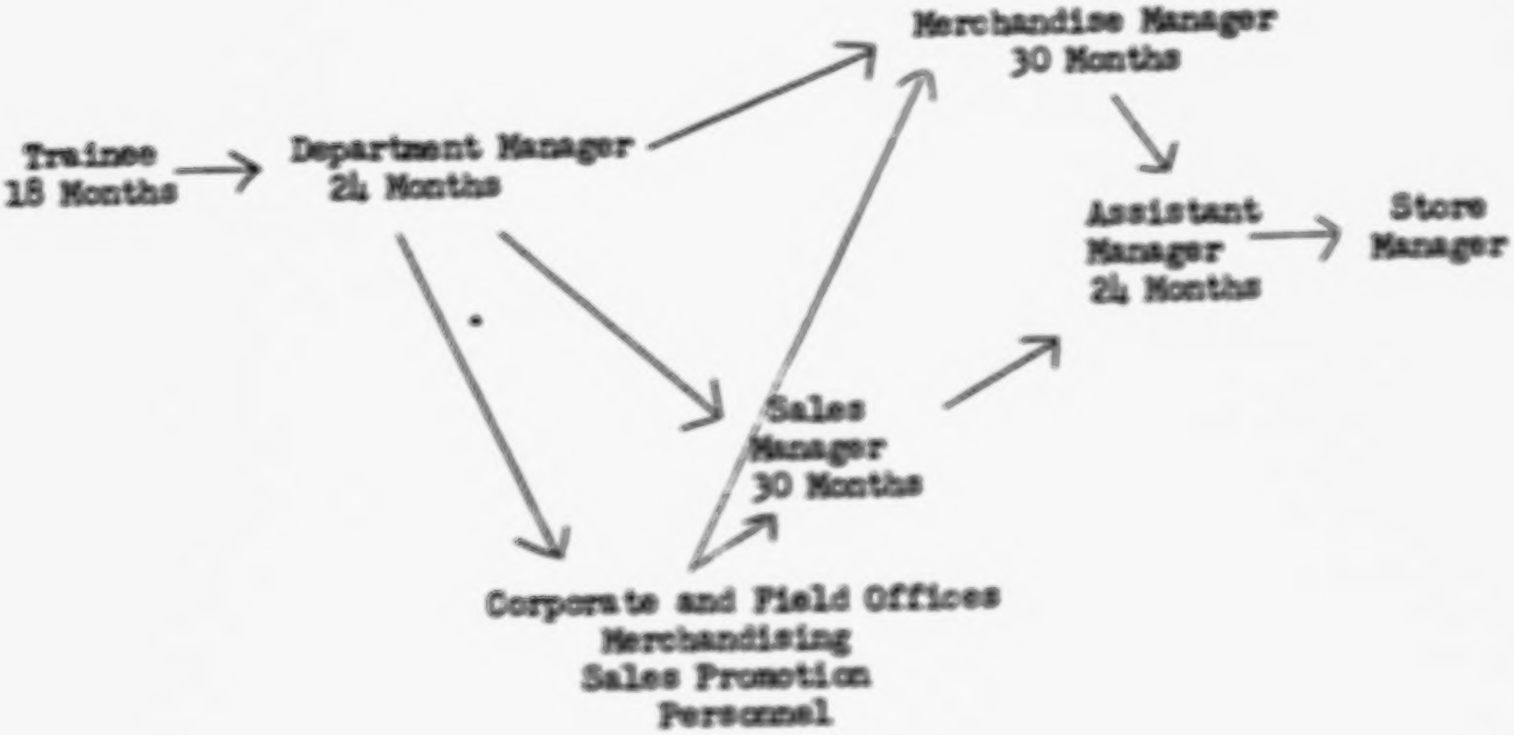
Manpower forecasts have been prepared by this location for the past ten years. Once a year one year projections of managerial needs are prepared. In addition, six month projections of total manhour requirements are prepared semi-annually. In the latter forecast, exempt and non-exempt requirements are estimated and the non-exempt category is further refined into sales and sales support personnel.

The manpower forecasts are prepared by the Personnel Manager and are based on sales forecasts. The Store Manager, the Assistant Store Manager, the Personnel Manager and two Merchandise Managers prepare the sales forecast. The estimate is based on sales trends for the past three years, adjusted for economic trends and other relevant factors. An example of a relevant factor is the number of upcoming union contract negotiations and whether they all expected to be settled without a strike.

The projection for managerial needs is derived by dividing the sales forecast by the sales goal per manager. This store's goal per manager is $1,200,000 per year. The aggregate forecast of managerial needs is categorized into 25 types of managers. Anticipated promotions are considered in estimating the different types of managerial needs. The device used indicates the average number of months spent by a manager in the principle job classifications. The following diagram describes this organization's typical promotion route and the average time spent in each job category. The average number of years required to go from a trainee to a store manager is eight.

Diagram A3

Average Time Required in the Typical Promotion Route


Trainee
18 Months
Department Manager
24 Months
Merchandise Manager
30 Months
Assistant Manager
24 Months
Store Manager
Sales Manager
30 Months
Corporate and Field Offices
Merchandising
Sales Promotion
Personnel

A report indicating the number and type of managers on board and the projected number and type of managers required is submitted to the corporate office. Before any changes-in the number on board can be made, the corporate office must agree to the change.

The projections of manhour requirements are also based on sales forecasts. Average sales per hour for all stores in the company are reported to the locations by the corporate office. The sales averages are classified according to the number of hours the stores are open per week. The sales forecast is divided by the appropriate sales average to estimate manhour requirements.

The manager forecast, once it has been acted on by the corporate office, and the manhour forecast are the basis of the personnel department's recruiting efforts. The other main use of manpower forecasts is financial planning.

An interesting approach to adjusting to inaccurate manpower forecasts is employed by this organization. In the event of an overestimate of manpower demand, attempts are made to spread the work. If this is insufficient, attempts are made to transfer personnel to other locations which are in short supply. Transfers of managerial personnel is usually possible because there is almost always some location in the country which needs managers. When there is an excess supply of lower level employees, transfers to other stores in this geographic area are arranged if demand permits. This practice, it is felt, explains why this organization's termination rates are the lowest of major American retail firms.

Case 10

This case is of a processor and distributor of seed to wholesalers. Its products are marketed throughout the world. In 1966 its sales were over 42 million dollars, its assets were over 19 million dollars and its employment was approximately 1,500.

The forecasting techniques of this company are quite typical of those employed by most organizations participating in this study. The atypical features of this case are the approach to estimating the impact of technological change on the firm's labor force and the manner in which attempts are made to control inaccurate manpower forecasts.

Forecasts of the number of new hires needed for the coming year are prepared annually. The forecasts are broken down into sales, administrative and production personnel needed for specific sales and plant locations. The division managers compile these forecasts. The manpower estimate is based on a projection of the gross sales of each division. The gross sales projection is a function of four factors: past acreage yield, sales potential estimate, projected weather estimates, and inventories. There is no formal projection technique for manpower forecasts in this company. The division managers use their own discretion in arriving at the forecast figures. It is believed that most division managers survey the supervisors to determine their manpower needs.

The division managers' manpower forecasts are submitted to a committee composed of the Chairman of the Board, the President and the Vice President of Personnel. This committee makes a judgement regarding each division's manpower requisition. Responsibility for accuracy of the forecasts rests with the division managers, but no formal control or accountability procedure is used. When a division manager has made inaccurate manpower estimates in the past, he can anticipate a more rigorous evaluation of his forecasts.

Many areas relevant for manpower forecasting that are considered on a formal basis in some other organizations are handled in an informal manner in this company. For example, little attention is formally given to considering the relative merits of training versus recruiting versus transfers as alternative means of meeting manpower requirements. This is done on an informal basis. The opinion in this company appears to be that their present method is effective and a more formal program would not result in sufficient benefits to justify the increased costs. The interviewer pointed out that this company has never really been adversely affected by manpower forecasting errors. The reason given is that the organization is quite diversified and inaccuracies in any one area can be covered by personnel from other areas.

The informal approach to factors affecting manpower requirements in this company is exemplified by the means of anticipating the effects of technological change. In the past, technological innovations have had a significant impact on their manpower needs. The technique employed is quite simple. A major source of innovations and information describing developments elsewhere in the country relevant for this company is the research facilities at the University of Minnesota. By having company representatives on formal and informal committees at the University and by participating in research projects conducted by the University, the company is in a good position to anticipate changes and the impact of these changes.

Case 11

This case is of a company which is one of the world's largest flour millers and food processors. It has operations in five countries and exports to over 70 countries. Its sales exceed 300 million dollars per year and it employs in excess of 5000 persons.

There are several unique features of the forecasting activities in this company. The manner in which forecasting is approached, at least on the surface, appears to be rather haphazard -- the divisions make their own forecasts. Many of the factors considered formally in projecting manpower by other companies are handled informally, by "feel" or by "rule of thumb". The divisions' forecasts are checked carefully against a corporate measure of management needs -- growth in company investment.

Manpower forecasts have been prepared by this organization for eight years. The projections are prepared annually, cover a period of one year, and are for managment trainee requirements. In addition to these projections, forecasts may be made of direct manpower requirements.

The manpower forecasting activities are the responsibility of the four division heads. All production or direct manpower forecasting is done by the line division heads if they feel such forecasts are necessary. The projection of direct manpower needs is left to the discretion of the line managers and are not directly controlled by corporate planning functions. There is no formal plan or technique to determine the number of direct personnel that will be needed by the divisions. Corporate opinion is that the line managers forecast from experience and their "feel" for next year's production and marketing schedules.

The forecasting of management personnel needs is coordinated by the Director of Organization Planning who reports to the Vice President of Personnel. Once a year the Organization Planning Director requests the four line division heads to furnish their requirements for management trainees. These requirements are broken down by desired educational background. There are no formal procedures or techniques to consider personnel movements into or out of a division. The forecast does not include middle management needs -- these are forecast by use of annual management replacement charts.

The methods used by the division heads in arriving at their needs are not determined by the Director of Organization Planning. The divisions follow a "rule of thumb" based on last year's needs, this year's versus last year's production schedule, losses by retirement, etc.

The management trainee requirements from the four division heads are summarized by the Director of Organization Planning. The Controller's department has developed a "formula" using long term capital investment as a predictor of managerial manpower needs. The Controller's department identifies the number of management trainees per unit (one million dollars) of long term capital investment. This ratio is used as a control by Organization Planning on the summary of the four divisions' projections.

The forecasted requirements are presented to the Corporate Long Range Planning Committee which consists of the Board Chairman, President, Vice President of Personnel, Senior Vice President for Corporate Development, and the Treasurer. The principal uses of these forecasts are control and planning recruiting efforts.

The computerization of production facilities and cost controlling techniques were significant technological changes affecting manpower requirements, according to the Director. Their impact is on both the kind and number of trainees. These changes are considered in forecasting needs.

Case 12

The techniques of projecting manpower requirements described in this case study are of a major public utility. Over 10,000 people are employed by this organization. The great majority of these are women.

The unique feature is the consideration given to external labor supply. Of the participants in this study, the approach to projecting supply utilized by this organization is by far the most comprehensive.

Projections of labor requirements have been prepared for over ten years. The forecast period and frequency of preparation are as follows: requirements for each of the next 12 months, prepared monthly; requirements for the next year, prepared quarterly; and requirements for each of the next five years, prepared annually. The projections are for manpower needs by department. There are seven departments each of which is divided into divisions, and these are subdivided into districts.

The manpower forecasts are the responsibility of the District Managers. The following description is of the forecasting process within one of the seven departments. The districts of this department are subdivided into units. The head of these units have from 80 to 200 subordinates, and these individuals prepare the manpower projections. The forecasts are based on the unit work load. The work loads are derived from the number of widgets[1] being used and the rate of use. Identification of work-units completed per manhour and the average time worked per employee enables the supervisor to estimate the units future manpower requirements.

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[1] Widgets is a term used to avoid revealing the nature of the service provided by this company, which if known would identify the company.

The District Managers in this department compile the unit projections and forward them to the Division heads with a copy to the Personnel Department. The district projections are reviewed by the State Personnel Supervisor. The projections are compared to industry data on units of work per manhour. Summaries of the district projections are submitted to the Division Managers, the Department Supervisors, the General Managers and the Vice Presidents of this organization. The stated purpose of manpower forecasting in this organization is to "initiate and sustain activities which will insure adequate numbers of qualified people are available and trained when and where they are needed to meet the company objectives."

The following points summarize what, in this organization, is believed to be the essential steps in making plans for manpower:

1. Identify what is to be done; that is, how large are the work loads going to be.
2. Specify the standards that are to be met. What are the service and cost objectives?
3. What are the resources of the unit? Identify the kind and quality of equipment available and the number and experience level or quality of the labor force.
4. Identify what resources will be needed? How many people will be needed? How many people will be required and when and what equipment is required and when?

As mentioned above, this organization forecasts labor supply. Such projections are prepared when local conditions indicate that potential problems could arise. An example of such an indicator is the difficulty in attracting job applicants. The following information is considered in estimating the future supply of labor. School registrations by grade provide reliable information of future annual input to the labor market. Many firms cooperate by providing information about their future plans, e.g. anticipated rates of growth and where geographically, they will expand. Most companies probably could not obtain such information. This organization has been able to because it is a public utility. Transportation companies and the State Highway Department provide information which helps the company estimate the mobility of people. Studies of industrial growth and living patterns in the urban area and a close watch on the availability of desirable housing facilities for single persons located close to this company's locations aids in estimating the number of hires that can be expected from out-of-town sources.

The importance of forecasting labor supply for company planning is made clear by this organization's experience. Projections of labor supply to 1975 suggest that this company's Downtown location will not be able to hire enough personnel. The plans to meet this shortage include the introduction of more sophisticated equipment which will increase the productivity of labor and the establishment of work centers outside the Downtown area where the anticipated supply will be more favorable.

Case 13

This corporation is a widely diversified manufacturing company. It has several different product lines as well as various plants and offices in the United States and foreign countries. In 1967 it employed approximately 53,000 people.

The basis for projecting manpower requirements in this organization is a sales forecast, which is the one most commonly used by those companies participating in this study. Although some of our respondents have found the relationship between these two to be rather low, results in this company are quite satisfactory. One year manpower forecasts are usually not in error by more than one percent.

Projections of managerial manpower needs have been prepared for 14 years. The forecasts are for five classifications of managers. These are: sales, laboratory, engineering, administration and production. The forecasts are completed annually for the current one year period, and the five year forecast is updated.

Projecting manpower needs is the responsibility of the Director of Employment. When this company originated its manpower forecasting program, a number of other types of forecasting were already being done. All other forecasts and budgets were based on forecasts of sales dollars. Consequently, an attempt was made to identify the correlation between sales dollars and employment by management category. Historical data suggested that the relationship was quite high. Obviously an accurate manpower forecast depends on an accurate forecast of sales. The Controllers Division of this firm provides the latter forecast. The past performance of this unit indicated that while the one year sales forecasts were quite accurate, longer forecasts were influenced by national economic variances.

Consequently, manpower projections although made for five years have been limited to one year for recruiting plans.

The following is the procedure employed for projecting managerial requirements. The total company sales forecast for each year is divided by the average sales per manager for the past five years. The resulting number of managers is adjusted for average turnover among managers for the past five years. The following table although representing salesmen in one division describes the method used.

A quarterly follow-up analysis of this technique has been carried out and the results indicate that the forecast error has been less than one percent.

The one group with which this approach did present some difficulties was salesman. An investigation indicated that it takes from six to nine months for a new salesman to become qualified. Therefore, it is necessary to have trainees on board well in advance of the time they are expected to produce. A schedule for the regular addition of salesmen throughout the year has been established. When this procedure for additions was implemented, the forecasting techniques used were found to be equally effective for salesmen as for the other categories.

The forecasts of manpower requirements which are jointly submitted by the Controllers Division and the Employment Department are submitted to the Vice President of Personnel and Industrial Relations, to the President of the Company and to the Management Committee.

Table A29

Projecting Manpower Requirements

Year	Salesman End of Year (Number)	Average During Year	Sales Per Man Col. 2 (000)	Percent of Turnover	1955 Sales Forecast (000)	Loss Through Turnover (Number)	- or - Forecast
1950	72	70	$211	7			
1951	77	74.5	220	5	+1,387		
1952	87	82	219	11	Avg.		
1953	93	90	234	8	212		
1954	92	92.5	210	6		7	None
Avg.				7			

Source: Wendell W. Burton, "Forecasting Manpower Needs -- A Tested Formula" in David W. Ewing, Long-Range Planning for Management, Revised Edition (New York, Harper and Row Publishers, 1964) p. 535.

There are two principle uses of the forecasts. Personnel bases its recruiting plans on the forecasts and it ties in with the total budget requirements of the operating and staff divisions.

Case 14

This case describes the forecasting techniques of a corporation which during 1967 employed 1200 persons in its seven American operations. In 1966 its assets exceeded 11 million dollars and its sales exceeded 28 million dollars. It supplies fabricated metal products to the manufacturers of construction truck and agricultural equipment. The majority of the labor force is made up of semi-skilled production workers. The other principle employee groups are technical, clerical, sales, and managerial employees.

The unique aspects of this case are the means by which internal labor supply is considered in meeting future manpower requirements, its use of a manning table, and that manpower requirements are related to the overall corporate plan.

This organization has been forecasting labor needs for three years. Requirements for six categories of exempt employees are estimated for each of the next five years. The employee categories are: engineers and personnel requiring a technical degree; managers requiring a technical degree; managers not requiring a technical degree; sales; jobs requiring technical training, but no degree required; and all others (finance, marketing, etc.). The five year manpower forecasts are prepared annually.

The division managers prepare the forecasts. The basis for the manpower forecasts are the division objectives as is indicated by the five year corporate plan. Factors included in the corporate plan are: sales forecasts, financial objectives, production plans, marketing plans, R and D plans, and estimates of technological threats to present product lines.

The corporate plan is prepared by the management committee. This committee is made up of the company president and the following division managers: finance, research and development, personnel, production, and sales and engineering.

Each division manager consults the managers reporting to him in order to estimate the exempt personnel required to meet the division objectives as specified by the corporate plan. The manpower forecasts are judgements on the part of the managers but who utilize all available data to estimate needs.

Each division manager submits a forecast to the personnel department, indicating the job title of the additional personnel required and the point in time at which the position should be filled. The division manager will indicate if the job should be filled internally and also if he has a preference for a particular internal candidate. Example A3 is the form used for this report. The personnel department consolidates the division forecasts and adjusts the estimates for turnover. The resulting report is presented in the form of a manning table. Example A4 indicates the form of the manning table and the assumptions regarding turnover.

The manning table is submitted to the management committee. The summary manpower forecast is used by the committee to estimate the feasibility of attaining the objectives specified by the corporate plan. For example, the firm could possibly not have the funds or capability necessary to hire the required manpower; consequently, the objectives might have to be changed. In addition to being used in corporate planning, the manpower forecast serves as the basis for the personnel department's employee development and recruiting plan.

Example A3 -- Manpower Forecasting Form

☐ - Indicates must be filled internally
○ - Indicates strong preference for internal candidate

Division:
Dept:
Prepared By:
Date:

Job Title - Specialty or Function	Fiscal '68				Fiscal '69	Fiscal '70	Fiscal '71	Fiscal '72	Total
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.					
Example									
Sr. Research Engineer					$\boxed{1}$			1	1
Research Engineer			①			1			2
Project Engineer		1			1		2		4

Example A4 -- Manning Table Form

Manpower Summary
Estimated Requirements - Fiscal '68 thru '72
Salaried Employees Only

	Fiscal '68									
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Fiscal '68 Total	Fiscal '69	Fiscal '70	Fiscal '71	Fiscal '72	Total Fiscal '68 thru Fiscal '72
I. Additional Exempt Personnel Required										
A. Engineers and personnel requiring a technical degree										
B. Managers/Supervisors requiring a technical degree										
C. Managers/Supervisors - do not require a technical degree										
D. Sales - (Sales Eng. or Acct. Exec.)										
E. Jobs requiring Engineering type technical training - degree not required										
F. All others (Finance, Production Control, etc. not included in Categories A - E.)										
TOTALS										
II. Additional Nonexempt Personnel Required										
All categories - see note (a)										
III. Turnover										
Exempt replacements required - all locations except Hyd. & Overseas (b)										
Nonexempt replacements required at G.O. (c)										
IV. Combined Totals										
Total estimated hiring effort for all G.O. Sal. plus exempt salaried at branches										
V. Total General Office Salaried Employment (351 as of 5-29-67)										

Example A4 - continued

Note:

(a) Based on ratio of nonexempt new jobs authorized versus exempt new jobs authorized for three-year period ending 6-1-67 (1.6)

(b) Based on .5% turnover per month.

(c) Based on 2.0% turnover per month.

(d) Not included in any of these figures are 14 exempt and five nonexempt current authorized personnel openings.

This organization does not forecast its requirements for production workers because, in the past, there has been no need to do so. Although demand for production workers is quite variable, quits resulting from resignations or lay-offs have been low. In addition, when requirements have increased, additional manpower has always been available on short notice.

Case 15

This case refers to a division of a nation-wide insurance company specializing in life and health insurance and in pension plans. Total income of this organization in 1966 exceeded 107 million dollars and employment in 1967 was approximately 480. The division described handles group insurance and employs 130 persons. Clerical employees are the major occupational group. The techniques indicated here characterize manpower forecasting in the other divisions of the company.

The aspects of special interest in this case is the refined technique of work control and the approach to facilitating short term transfers from one department and division to another in response to fluctuations in labor demand.

Manpower forecasts have been prepared for two years. The manpower forecast, prepared annually, is for total employment and covers each of the next five years. The employment forecast is the responsibility of the division manager and is based on sales forecasts. The latter is a "seat of the pants" judgement on the part of the top level division management. The forecasts of sales and employment is submitted to the top company officials.

In addition, a more precise one year forecast of total employment is completed annually. Each department within the division submits a projection of work load, manpower needs and expenses to the division manager. The division manager in turn submits a projection containing the same information to the controller, and he in turn to the company president.

The department forecast indicates:

(1) A list of projects for the coming year.

(2) The planned beginning and completion dates of the projects.

(3) A projection of manpower requirements for the coming year on a monthly basis.

(4) A projected salary budget for the coming year on a monthly and on a cumulative basis.

(5) A department cross-training chart showing each job in the department, each employee in the department and the cross-training of each person. Cross-training refers to jobs in the department for which each person is trained.

(6) A graph indicating historical department salary costs.

The division forecast contains the identical information with the following exceptions: Item No. 2 is deleted and Item No. 5 is changed to include only key personnel in the division.

The forecast of employment for each department is derived by means of the following:

(1) A least square projection of work load trend.

(2) Identification of manhours required per unit of work (applications for insurance.)

(3) The projection of work activity times the manhours required per unit of work indicates the number of manhours required. This figure is adjusted to specify the manhours required per week.

(4) Adjust manhour projection for training time of new employees and cross-training of regular employees.

(5) Divide the projected manhours per week by the average number of hours worked each week per employee to estimate the number of employees required.

These manpower forecasts aid in planning recruitment, selection, promotions and transfer. Because of the cross-training information it is relatively easy to arrange transfers between departments and divisions in the event of an under or over-estimate of labor requirements. However, their primary purpose, according to the division manager, is control of work, employment, labor costs and training. Each month the Department Manager reports the project progress, comparisons of projected and actual employment and salaries, and changes in cross-training to the Division Manager. Reports containing similar information prepared quarterly by the division managers are submitted to the Controller.

Based on this company's experience with change, both administrative and technological, it is surprising that no formal estimate is made of its impact on future labor requirements. The use of computers to perform certain clerical tasks is the primary factor which permitted this company to double its income since 1957 and yet reduce total employment by ten percent. Regarding administrative change, a study of this company by a management consultant two years ago indicated that it was staffed to handle peak work loads and to perform some double work. The latter refers to such things as having someone check another person's addition. Much of the double work was cut entirely. Top management decided that the improved service resulting from staffing for peak work loads did not justify the additional cost and consequently, this practice was discontinued. It would seem reasonable that when one's experience with change has been as this organization's, procedures would be established which would attempt to estimate the manpower impact of future changes.

Case 16

This organization is a research laboratory and manufacturing facility having in excess of 2500 employees. The parent organization is a major developer and manufacturer of electronic data processing equipment.

In the opinion of the staff conducting this exploratory project, the forecasting techniques of this organization are the most sophisticated of any one respondent participating in this study. Certain factors considered by other organizations are not included in the techniques of this respondent, but on the whole its techniques are most comprehensive than any other individual organization.

The manpower forecasting activities in this firm are the responsibility of the Planning Department whose functions include forecasting new products and space allocation. The Planning Department reports to the Assistant General Manager who in turn reports to the location's General Manager. The manpower forecasting responsibilities are divided between two individuals. One forecasts the "direct" manpower or those directly involved in production. The other is responsible for forecasting "indirect" manpower or the support personnel.

Manpower forecasting is an integral part of the entire planning cycle. The planning cycle runs for a two year period. Five year projections are also calculated and the company uses them to provide long range direction.

Inputs into the "direct" forecast are of three basic types, production schedules, inplant manufacturing hours by machine or product, and other factors (see Example A5). The output (see Example A5) is provided by department and functional level.

Example A5 -- Direct Manpower Forecasts

Inputs

1. Schedules and loads
   - a. announced production schedule
   - b. developmental production schedule
   - c. special requests for customer specified modifications
   - d. inplant load of outplant requirements
   - e. behind schedule load
   - f. proposed resourcing load (subcontracting to vendors)
2. Inplant manufacturing hours by machine (product) type
   - a. dynamic program estimate (time estimate to complete production)
   - b. cost target hours (a target or ceiling for the cost of the manhours required for the production)
   - c. prototypes -- an estimate of the cost of producing new unmarket products for testing)
3. Other factors
   - a. performance (expressed as a % of the standard time necessary to complete the production of a unit by an individual)
   - b. utilization -- % manhours spent on direct production, % of time in recreation, etc.
   - c. sickness, accident and personal reasons -- % of manhours that will be taken up
   - d. vacation and holiday -- % of manhours
   - e. learning curve data -- considers the learning time or manufacturing time curve for a product

   f. unmeasured hours -- time that is typically unaccounted for -- this is used as an index of the thoroughness of the planning model and the department

Outputs

1. Direct work load (# of employees) required
   a. by man for 3 years
   b. by machine, sub assembly, final assembly and quality control
   c. by machine type
   d. by product family

The calculations are all done on a computer.

The indirect manpower is grouped into variable and fixed manpower. The variable manpower is further sub-grouped into plant manpower not related to any one product but whose work load varies as total plant manpower varies, and function manpower whose load varies depending on the plant's functions and changes in product mix. Fixed manpower is made up of "hard core" employees, or those not affected by plant or function work load and "management assigned" employees, or those jobs established by management to perform desired services. The key to forecasting indirect manpower needs is what the firm calls a "manning table". Inputs into the manning table are indirect employees by name and department, base load, projected load and "elements" (see Example A6). Elements are activities or actions taken by the various functions in the firm that will affect the percent of time an employee must devote to a particular part of his job. Base load is the typical or average number of these actions (elements) taken in a base period (normal one month). Base load is based on past history. Projected

Example A6 -- Work Load Projections

Doe, John 834621 355

Mann'g Factor	07	10	11		
%	40	40	20		

Not in indirect manpower ceiling: ☐

Function No.: 8

Mann'g Factor					
%					

% must equal 100%

Function No's.:

Administration	0	Personnel	6
Manufacturing	1	Prod. Control	7
Mfg. Engineering	2	Purchasing	8
Quality Control	3	Systems	9
Controller (Finance)	4		
Plant Engineering	5		

⋮ ⋮ ⋮ ⋮ ⋮ ⋮ ⋮

Factor Code	Element	%	Base Load	Conver. Factor	Proj. Load	Men Req'd
07	Purchased Part No.s	.40	800	.0005	1600	.80
10	Purchase Orders	.40	800	.0005	1000	.50
11	Operational Subcontract	.20	50	.0040	70	.28
		1.00				1.58

load is the projected amount of actions to be taken in the future period (every month for two years). The projected load is based mainly on the information provided in the "schedules and load" portion of Inputs to the Direct Manpower model.

Each functional manager is asked to decide what percent of each of his subordinates time is taken up by each element. In Example A6, John Doe spends 40% of his time on actions as a direct result of the "element" purchased part numbers. The base load for the periods was 800 purchased part numbers resulting in a conversion factor of .0005 (the amount of time spent on each part). The projected load of 1600 is then simply multipled by the conversion factor and the result is the number of men required for the projected purchased part number load. John Doe it seems has three elements affecting his job and given the projected load he will either have to work substantial overtime, bring in new help or subcontract some work out.

This same procedure is done for each individual employee, summed within the department and function and across the company. The result is a total indirect manpower requirement projection. The projected total requirement is broken down by function. The projected requirement is compared to the total on board and the difference is made up by various suggested strategies, e.g., subcontract, part-time, overtime.

The results of both the direct and indirect projections are combined and presented to a "work load committee" which meets every two week or "by request." The committee is made up of the General Manager, the functional managers and representatives of the planning department. The result of the meeting is manpower ceilings or available manpower for each function. Variations in the work load are handled by various other strategies such as subcontracting to vendors during peaks and pulling back contracts during valleys.

When asked how they handled technological change, the respondent felt this factor was built in by the frequency with which they updated their projections (monthly or by request). For example, it was not at all an exception for them to get a request at any time for the manpower projection for an entire plant or new product line. In other words, this company has reached the degree of sophistication of simulating various product lines and plant facilities on the computer before any action is taken.

The outputs from the direct and indirect projections are then sent to the functional managers who then operate using the projections as a guide.

Little was done on the supply side with the interesting exception that due to the shortage of skilled trades in the area, and the projection of increasing needs, the firm has taken to hiring unskilled and training them. The firm indicated it could break down the projections by other skill groupings in addition to direct and indirect but that further mechanization is necessary to do the job economically.

Accountability for the accuracy of the estimates rests with the planning department, but since the projections become the standard and guide for the line it seems that the line provides extremely accurate inputs. When asked if managers attempt to beat the "system", the response was "not too often" since they are convinced that accurate planning is a tremendous aid in their decision process. The accuracy of the projections are generally within two to three percent. They felt the accuracy was completely a function of the accuracy of the projected production schedules.

Case 17

This case refers to a division of a large corporation whose sales in 1967 exceeded 1¼ billion dollars and whose employment exceeded 100,000. The division discussed here produces and services data processing equipment. Its employment in 1967 was 7,900. A relatively large proportion of technical and managerial personnel are employed by this division.

The special aspect of this case is the emphasis on relating manpower forecasting and planning to other aspects of corporate forecasting and planning. A second interesting feature is that plans are prepared, indicating how the forecasted manpower requirements will be met.

Forecasts are prepared semi-annually for all employees. Manpower forecasting activities have been carried on for the past five years. The forecasts are for each of the coming five years. In the one and five-year forecasts, needs are specified by location and by the following employee categories: professional, managerial and administrative, technical and clerical and factory. These forecasts indicate whether the manpower needs will result from separations, expansion of current activities, or from new activities. The one-year forecast of professional manpower needs specifies the number of each of seven different degree types needed, and the number which can be new grads and the number which require experience. The amount and type of experience is also specified.

Manpower forecasts for the entire division are prepared by the personnel department. In addition, the operating departments prepare forecasts of their manpower needs. The forecasts are based on information pertaining to business prospects, changes in products which affect manpower needs and on separation rates. It should be noted that this was one of the few respondents in our study which was of the opinion that product and technological changes have a significant impact on their manpower requirements. The effect is not on the number employed but rather on the skill mix of the labor force.

The two manpower forecasts are reported at the semi-annual planning meetings. These meetings are attended by the division officers and department heads. Hopefully the sum of the department forecasts will equal, or nearly equal, the personnel department's forecast for the entire division. Discrepancies are ironed out at these meetings. Once a manpower forecast is agreed upon it must be reconciled with facility, financial and budget plans, market forecasts and revenue per employee goals. Each aspect of the division's plans must relate reasonably to all other types of plans and expectations.

The Director of Industrial Relations prepares a plan to meet the one-year manpower forecast. This plan estimates the number of positions, by employee category, which can be filled internally through transfer, promotion and training, and the number of positions which must be filled through recruiting. The training plan indicates the number of individuals which will be trained, the type or content of training and the method of training (University or company course, job rotation, coaching, etc.). The anticipated cost of training and recruiting are specified in the manpower plan.

This respondent is unique in that manpower supply is viewed as a constraint affecting manpower planning and other phases of planning. For example, plans for expansion may be delayed or revised because labor of the required type is not available. Almost all of our respondents took the position that manpower supply is not a limiting factor. The typical attitude was that regardless of how much labor is required there would be an adequate supply and supply need not be considered in estimating labor requirements.

The manpower forecasts and plans which result from the planning meetings are reported to the Vice President, the General Manager, and the President of the corporation. The forecasts and plans are used in the typical ways, planning budgets, training, transfers, promotions and recruiting. In addition, these forecasts and plans will be used for planning at the corporate level. A similar process of integrating the different divisions' forecasts and plans is carried on at the corporate level.

Case 18

The forecasting techniques of a division in a corporation, having 1967 sales exceeding 700 million with employment in this division of approximately 2,100. The major component of this division's labor force is semi-skilled production workers.

This case is being included because of the emphasis on forecasting production worker requirements and because of its approach to matching labor supply and labor demand. In this organization, when supply and demand do not match, attempts are made first to adjust labor demand.

Manpower forecasting has been done for five years. Two manpower forecasts are prepared, one for production worker requirements and the other for total employment. The forecast of total employment is prepared annually by the Manager of Manpower Planning working in conjunction with the Corporate Planning Group. The forecast is for the coming five and ten years. The inputs for this forecast are growth and new products. The forecast is submitted to the corporate management where it is used for corporate planning.

The estimates of production worker requirements are prepared monthly and cover a six month period. The Manager of Manpower Planning is responsible for these forecasts and bases them on sales projections. The sales forecasts are by product, model and cover the upcoming six months. Production control identifies the average daily rate of production by product necessary to meet the sales forecast.

The manpower planner also estimates the internal labor supply for the next six months. This is done by adjusting the number of production workers on board for separations and time lost because of vacations. If requirements exceed supply, three courses of action are considered: expand the work force; have the present labor force work overtime; and establish production priorities. The first alternative is favored when there is a large increase in manpower requirements, but with the exception of summer months the recent tight labor market has made large increases in employment impossible. Overtime is favored for smaller increases in production; however, when used for periods in excess of two or three weeks the efficiency of labor falls. In this division it is estimated that after working ten hours a day for two or three weeks, production in a ten hour day is about equal to production in an eight hour day under normal conditions. The drop in efficiency is attributed to the heat in the production area. The final and least favored alternative is to produce those products needed immediately, and hope that more distant demands can be met in the future.

When forecasted supply exceeds forecasted demand, attempts are made to adjust demand. This is done by producing for inventory. This organization feels that the intangible benefits stemming from a steady employment for their regular work force justifies such action. When producing for inventory is not feasible, workers will be laid off.

The forecasts of production worker requirements are submitted to the division general manager. This individual may adjust the forecasts on the basis of information to which he has access but which is not available to the manager of manpower planning.

As indicated above, the manpower forecasts are used for planning production schedules and for employment decisions. In addition, the manpower forecasts are considered in estimating future earnings of the division.

The influence of technological change in this division is probably characteristic of its impact in most organizations, particularly those in manufacturing. Its impact here is considered to be minor at any one point in time but is more or less continuous. Changes either in methods of production or in products produced are made regularily, and these result in small but regular changes in manpower requirements. The writer's opinion is that a systematic analysis should be carried out which would indicate the significance of technological change for projecting manpower requirements. Perhaps one of the main factors affecting labor requirements, if not in level then in skill mix, is being overlooked.

Case 19

The manpower forecasting techniques of a world wide corporation in the food industry are related in this case study. In 1966 its assets were over 130 million dollars, its sales exceeded 500 million dollars and employment was about 12,000.

There are several interesting aspects of this organization's forecasting activities. One has to do with approach to estimating the progression of exempt employees within the company. In addition, two possible problem areas are suggested. One is the assumptions underlying manpower forecasts and the other is the internal labor supply.

Manpower forecasts have been prepared for many years in this organization. At the present time its activities in the area are in a state of transition. Early forecasting efforts consisted of three year projections of requirements for recent college graduates. The reason for focusing on recent graduates is the company policy of promotion from within.

The position of Corporate Manpower Planning Manager was created less than two years ago. One of his areas of responsibility is manpower forecasting. In contrast to the earlier forecasting, current activities are channeled in two new directions. First, three year projections of exempt employee requirements are prepared annually by managers of the various operating units. These forecasts are a segment of program and financial planning. Labor costs are estimated in these forecasts and they are reported to the budget control staff. This group reviews the budgets and forwards the forecasts to the Corporate Manpower Planning Manager. The ultimate destination of the forecasts for exempt employees is the College Relations and Recruitment Manager who uses them for recruiting planning.

The manpower forecasts are based upon gross sales estimates. These estimates are extrapolated from demand curves for existing products and from the objectives set for new products and from the objectives set for new products to be introduced. The conversion of sales forecasts to estimates of manpower requirements is at the discretion of the operating managers.

Two points were mentioned by the Manpower Planning Manager that should be considered in any organization which is installing a manpower forecasting program. First is the possible problems which may develop if exempt positions are overstaffed. The advantage of this practice is that one is assured of a sufficient supply of qualified managers. For example, suppose a corporation is considering the acquisition of a company that is sound in all respects except the quality of its managers. If the corporation has the supply of qualified managers assumed above, it is free to proceed with the acquisition. The problem which could arise as a result of this practice is that managers may leave the organization because enough challenging positions are not available.

A second consideration relevant for manpower forecasting is the assumptions on which the forecasts are based. The Manager of Manpower Planning pointed out that if one is in a position such as his, it is necessary to be aware of the assumptions operating managers make about the states of nature during the forecast period. He stated that common assumptions are not required, rather just the specification of the assumptions that are made. With this information one is in a better position to compare and analyze the various operating units' manpower projections.

It was indicated above that the current forecasting activities in this corporation are moving in two new directions. The second channel involves forecasting promotions of exempt personnel and is under-going pilot testing at the present time. Operating managers provide the Manpower Planning Manager with flow charts which indicate projected moves of the exempt employees in their units. These flow charts cover a three year period and are based on manhour requirements necessary to meet established program objectives. This approach is focused on particular individuals and their career plans. The flow charts are reported for each exempt employee in the following form:

Entering Month	Position Entering	Position Left
0 (origin)	2 (job title)	2 (job title)
8	4	2
21	7	4

The column at the left indicates months into the future. The 0 represents the present, the 8 refers to eight months from the present, and the 21 refers to 21 months from the present. Each exempt position is given a code number and these are represented in the middle and right columns. The middle column indicates the position held or expected to be held by the individual at various points in time; the column on the right indicates the position held just prior to promotion or transfer. The operating managers estimate at what time in the future each individual will move to a new position. This is to be based on an estimate of when the individual will be capable of handling the new position and an estimate of demand conditions, plus discussions with each individual regarding his career plans. In these discussions each individual specified the kind of position he wants next year, two years from now, and so on.

The flow chart would be read as follows: At the present time the individual is in position two, eight months hence he is expected to leave position two and enter position four. Twenty-one months from now he is expected to leave position four and enter position seven. No other position changes are anticipated for this individual during the next three years.